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NIGEL QUIRKE-BOLT

M2563376

**AN INVESTIGATION INTO THE EFFECTIVENESS OF
COMPUTER MEDIATED CONFERENCES,
FOCUSING ON ASPECTS OF STUDENT TEACHER REFLECTIVE
PRACTICES AND PROFESSIONAL SOCIALISATION.**

DOCTOR OF EDUCATION (Ed.D.)

JANUARY 2010

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Abbreviations

| | |
|------|--|
| CMC | Computer Mediated Communication |
| DES | Department of Education and Science (Ireland) |
| ECDL | European Computer Driving Licence |
| EU | European Union |
| HCI | Human Computer Interaction |
| IA | Interaction Analysis model |
| ICT | Information and Communication Technology |
| ITE | Initial Teacher Education |
| NUI | National University of Ireland |
| NUIM | National University of Ireland, Maynooth |
| OECD | Organisation for Economic and Co-operation Development |
| PGCE | Post Graduate Certificate in Education |
| PGDE | Post Graduate Diploma in Education |
| PI | Practical Inquiry model |
| VLE | Virtual Learning Environment |

Abstract

This study investigated how effectively student teachers engaged in reflective practices within on-line discussion forums, and the potential of these forums to encourage professional socialisation.

The participants in this study were a cohort of post-graduate students at the National University of Ireland, Maynooth, (<http://www.nuim.ie/academic/education>) who were studying a full-time one-year course, the Postgraduate Diploma in Education (PGDE), with the aim of becoming qualified teachers in post-primary schools.

This study used both quantitative and qualitative research methods within a case study approach and utilised on-line questionnaires, focus group discussions, semi-formal interviews and an examination of the messages posted in the tutorial on-line forums using the analytic methods of interpretative phenomenology, discourse analysis and grounded theory.

This project referenced a number of methods used in other studies to identify, measure and categorise the reflective activities of the student teachers in the on-line forums. The result of this work has led to a modified approach that identified additional categories to more appropriately identify and measure the student teachers' reflective practices. The outcome of identifying these new reflective categories could offer the on-line tutor an alternative focus for their on-line teaching of reflection and their encouragement and development of the students' reflective activities.

In addition, this study identified how the student teachers' experience and socialisation within the on-line discussion forums helped them to develop their thoughts, values, attitudes and beliefs about the profession they hoped to join and so developed and supported their professional socialisation.

The findings from this study highlight implications for the use of on-line forums as a pedagogic tool in developing reflective and professional socialisation practices and a number of recommendations are presented. This is followed by some suggestions and directions for future research.

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Special mention should be made of the influence on this research of Professor Robin Mason, Open University, who died on 15 June 2009. This research project was influenced greatly by her work in on-line teaching and learning, in general, and computer mediated communication in particular.

Thanks to my wife Johanna and children, Patrick, Marianne, Brendan and Róisín, who showed extraordinary patience during the past four years and gave me the space, support and encouragement to keep to the various deadlines within the project.

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Chapter 1 Introduction

The overall focus of this research was to investigate the effectiveness of computer mediated communication as a form of communication for student teachers attending a teacher education programme. The participants in this study were post-graduate students at the National University of Ireland (NUI), Maynooth, (<http://www.nuim.ie>) who studied a full-time one-year course, the Postgraduate Diploma in Education (PGDE), with the aim of becoming qualified teachers in post-primary schools in Ireland. In order to gain qualified teacher status the student needs to become registered with the Teaching Council. As the regulatory body for teachers in Ireland, the Teaching Council produces a code of professional conduct for teachers, which covers standards of teaching, knowledge, skill and competence. The Teaching Council promotes and develops teaching as a profession at primary and post-primary levels and maintains a register of all teachers who teach in recognised schools in Ireland.

The PGDE students had access to a virtual learning environment (VLE), where lecture notes and course materials were made available, twenty-four hours a day, seven days a week, both on and off campus. The VLE also provided students and tutors with opportunities to communicate on-line using various discussion forums. This research study investigated two specific areas within the on-line communication that were carried out by the student teachers whilst using the VLE: firstly, the effect on the reflective learning experience of the student teachers within the various on-line discussion forums, leading to suggestions on how this experience might be improved; secondly, the potential of on-line discussion forums to encourage professional socialisation.

The student teachers' interactions within the on-line forums were monitored closely using a case study approach. In essence, this approach was selected in preference to an ethnographic study, due to the duration of the course and the changing student cohort from one year to the next; refer to Chapter 3 Research Methodology for full details.

This chapter provides the rationale and context for this research by introducing: the technology that is used by teachers in post-primary schools and third level colleges; how this technology can be used to support communication; how the changing profile of the student teacher has influenced this research; the importance that is placed on the teacher education programmes of reflective practices. The theoretical framework adopted by this research is then described and this is followed with a description of the environment in which this research study has been carried out.

Technology in schools and colleges

Classroom teachers have traditionally valued items of equipment that help them to teach more effectively. Owston (1997) refers to these items of equipment as 'tools' and they are used to make the task of teaching easier. In the past, these tools have varied from general items such as blackboards and textbooks, to more specific items such as past pupils' projects and demonstration aids. With the introduction and increased availability of technological equipment teachers have the opportunity to adopt a greater variety of teaching techniques in their classrooms. The technology in schools and colleges has developed considerably over recent years, and currently includes such items as overhead projectors, audio and video recorders, televisions, data projectors, interactive whiteboards, computers, local area networks and the Internet.

Lecturers in third-level colleges are also using technological equipment in their delivery of courses. Shaw and Polovina (1999) describe how multi-media presentations, video-conferencing and the use of computer networks are becoming standard components in many undergraduate courses. Student teachers attending teacher training colleges are experiencing, as learners, many of these current technological innovations and are seeing at first-hand how these developments are increasingly affecting current teaching practices in college, and how technology could potentially be used to add to or change the format, delivery and effectiveness of the learning process both in the classroom and in the school (Austin and Anderson, 2008).

Changes in teaching practices are being encouraged from various studies; one of the recommendations of the Dearing Report (Dearing, 1997) was that Information Technology should be an integral part of the learning strategy of all students. The same report also predicted how the use of computers in the delivery of course material and the organisation and communication of course arrangements would increase over the next ten years. The European Commission (2002) outlined an e-learning initiative in the document 'eEurope – An information society for all', which described the importance of bringing people, schools, organisations and commerce into the digital age and creating a digitally literate Europe. The eEurope 2002 and 2005 'Action Plans' (European Commission, 2002) outlined the goals that schools should work towards. For instance, schools should provide high-speed Internet access and multimedia resources and school pupils should be given the opportunity and encouragement to become digitally literate and be equipped to live and work within an information society.

In response to these developments the student teachers on the PGDE course at NUI Maynooth are encouraged to use Information and Communication Technology (ICT) to communicate and participate on the course and to integrate it into their classroom teaching

during their 'teaching practice' placements. The student teachers receive formal training in the use of technology and its applications both for their own professional development and for their use within a classroom setting. The student teachers attend compulsory lectures and workshops on Educational Technology and there are opportunities to join Computer Studies seminars and various short courses and demonstrations on school-based computer applications. The Education Department provides the students with access to a fully equipped computer room and resource centre, which supports both general and specialised applications of ICT, in addition to other computer facilities on the campus.

Lecturers in teacher training institutions are cognisant of the influence their teaching methods and use of ICT have on student teachers (Austin and Anderson, 2008), and NUI Maynooth attempts to use ICT pro-actively to encourage the students to integrate ICT into their classroom teaching. For example, a recent development on the course has been the use of a VLE, which is used to distribute lecture notes, handouts and electronic resources as well as providing various forms of electronic communication, such as instant messaging, chat facilities and discussion forums. Other developments are planned, such as, electronic access to catalogued educational resources and various resource 'learning objects'. The dilemma for NUI Maynooth, and other colleges, is in deciding how far they should go to embrace new technologies, to what extent they should adopt these methods and the effects of altering existing teaching and learning contexts (Beller & Or, 1998).

Use of technology to support communication

In recent times the developments in technology have led to a growth in the opportunities for communication between people. For example, one such development has been the use of VLEs within higher education courses.

NUI Maynooth began developing its own VLE in 2002, called MyVLE, in response to demands from various faculties. The university wanted the VLE to support a variety of courses, ranging from the fully on-line e-learning course to the courses that only required a distribution of course notes or digital submission of assignments (Ward *et al.*, 2007).

Building on this development Maynooth went on to adopt the Moodle (<http://moodle.org/>) platform in 2005, which is currently used by all students and members of staff. Since this time Moodle has grown considerably and its use is now widespread and supports the majority of courses at the university. Currently, approximately 270 people are editing modular courses and there are habitually 2500 independent student logins each week.

Every student who enrolls on a course in NUI Maynooth is given a username and password to enable him or her to securely access the Moodle VLE. Moodle runs as an interactive web site that incorporates a number of features and activities, such as discussions forums, that have been designed to engage the students in collaborative student-centred learning (Dougiamas and Taylor, 2000).

The use of NUI Maynooth's VLE as a component within the university's teacher education programme gave rise to a variety of questions. For example, why and how should a VLE be used on a teacher education programme? If it is to be used to what extent should it be incorporated into courses and how should it replace or support other forms of communication?

Student teacher profile

When addressing questions on the appropriateness of using technology in general and a VLE in particular an important consideration was the profile of the student teacher.

Research by Clarke *et al.* (2005) shows how the profile of student teachers attending teacher education programmes is changing in Ireland. For example, a noticeable

development in recent times has been that student teachers are entering teacher education courses with a much broader range of experiences than they have had previously. Growing numbers of student teachers are no longer entering the teaching profession through the traditional route of school, college and teacher education diploma, but such students are being joined increasingly by a more diverse type of entrant. These entrants differ in their age, academic qualifications, educational background, experience, and more recently their cultures and native languages. Clarke *et al.* (2005) found that just over a half (58%) of all student teachers have previous formal teaching experience and 27% have a masters or doctoral qualification. Consequently, within the cohort of student teachers there is a rich and diverse body of knowledge and experience that could be used as a valuable resource.

The above characteristics of the student teacher profile suggest that the socialisation and exchanges between students should be an important element of the course. This could be incorporated into the use of the VLE, which should not focus on the distribution of course handouts, assignments and lecture notes, but that an importance should also be given to using the VLE as a communication tool that presents the student teachers with opportunities to access the wealth of valuable information that the student group possesses, and provide a mechanism for them to share the knowledge and experiences of one another.

The informal social interaction that students engage in has long been regarded as an important component of undergraduate and postgraduate courses (Coser, 1970; Crane, 1972; Hagstrom, 1965; Price and Beaver, 1966; Weedman, 1993). Attending a course allows students to communicate and exchange thoughts, debate and discuss issues, develop and test their ideas against the thinking of each other, all of which is described by Weedman (1999) as essential to the growth of their knowledge.

Consideration of the student teacher's profile led to a variety of questions. For example, to what extent could a VLE be used to disseminate relevant student teacher experience and knowledge amongst the PGDE cohort? Should the PGDE course encourage the student teachers' on-line socialisation with a view to developing the students' capacity to engage in professional socialisation?

The PGDE Course

Certain characteristics of the PGDE course strongly influenced the development of this research. For example, the dual demands that the PGDE course placed on the students between teaching practice school and university highlighted the need for an accessible communication system that could be used both on and off campus. Another example is the importance that the course placed on developing the student teachers' reflective practices. These influences from the PGDE course are explained in more detail below.

The NUI Maynooth PGDE student teachers' working week is divided between three days in college and two days in school. During their three days in college the students attend lectures, workshops, tutorials and subject methodology seminars. The remaining two days of the week are spent in school, on 'teaching practice', where the student teachers are required to teach eight class periods. The resultant busy nature of this course significantly reduces the students' opportunity to communicate face-to-face with their peers and tutors. Alternative methods of communication other than face-to-face are needed and the computer mediated communication discussion forums of the VLE provide such a medium.

A feature of many initial teacher education courses is the encouragement and development of the student teachers' reflective practices. Teacher education programmes encourage student teachers to become 'reflective practitioners' (Schön, 1982, Brookfield, 1995),

where they analyse their experiences from teaching practice, draw on education theory and rehearse solutions in conversations and discussion with other students and tutors. This is very much the case at NUI Maynooth, where the student teachers are strongly encouraged to keep a reflective journal detailing their experiences and progress in both school and college, and where they also have to submit a reflective essay, that draws on the material from their journal, as a coursework assignment. The student teachers enthusiastically compare classroom experiences and regard each other as rich educational resources (Bucher and Stelling, 1977). The argument for the use of computer mediated communication on NUI Maynooth teacher education courses will be considerably enhanced if evidence suggests that this form of communication encourages reflective practices amongst the students.

Research questions

The context that has been described above has led directly to the research questions of this research. The increasing influence of technology in schools and the use of technology as a communication tool, through the use of such developments as VLE's has raised a number of questions for educators on how, and to what extent, such technologies should be used.

This research focuses on the use of a VLE on a teacher education programme and investigates how effective on-line discussion forums within a VLE are as a communication tool. The focus of this research is not just to examine how a VLE can support student teachers' interaction, but more importantly how a VLE can be used to encourage the student teachers' communication *and* reflective practices. It is from this context that the first research question is based:

- Can a VLE's discussion forums support and encourage reflective thinking?

If the VLE is to be used as a communication tool in place of, or to supplement, face-to-face communication then it should have the capacity to support the socialisation of the student teachers, where the student teachers can interact and exchange information on their coursework, their experiences from 'teaching practice' and their own personal development. This need describes a professional socialisation, which is described in greater detail below, and which leads to the second research question:

- To what extent might the use of on-line discussion forums within a VLE encourage the emergence of a community and professional socialisation?

From the context that is described above, a theoretical framework was adopted that helped to place this research study within a wider educational context, and this is described in the next section.

Theoretical framework

To investigate the effectiveness of computer mediated communication, using the criteria of the student teachers' reflective practices and professional socialisation, a number of theoretical concepts were referenced and engaged with. This was to draw upon the knowledge that already exists and to utilise this knowledge to add both relevance and depth to this research study. This research builds upon these theories and, within the context of computer mediated communication, it is hoped moves them forward.

The theoretical concepts that I referenced were both broad and varied, in that they involved the substantial and well researched areas of both technology and education. I began by investigating the topic of reflection and the importance attached to it by educators. Many

third level colleges actively promote students' reflective abilities, because it is widely recognised that reflection helps students develop critical thinking skills and plays an important role in learning processes (Dewey, 1938). For example, the Education Department in NUI Maynooth, formally teaches the student teachers how to engage in reflective practices and includes a 'reflective essay' in the course assessment.

Reflection can be viewed as a process where students continuously reference past experiences, actions, beliefs and lessons learned with new knowledge and so construct new knowledge and meaning (Dewey, 1938; Van Manen, 1995). This research involves the student teachers reflecting and communicating in on-line discussion forums with other student teachers and their tutors, where they discuss, explain and listen to the views of others and reflect on these exchanges as they formulate and express their own developing opinions and knowledge. This form of learning is constructivist, where the student teachers construct knowledge through their reflective interactions with other participants on the PGDE course (Johnson, 2001), and constructivism provides the first concept in the theoretical framework of this research project.

While an important part of the student teachers' learning process is the interaction the student teachers experience with the other student teachers and their tutors, consideration should also be given to the interaction between the student teachers and the professional educational community that is found in both the student teachers' teaching practice school and the university. Dewey (1938) described how the individual and society cannot exist separately and that to understand education an understanding of the exchanges between personal interest and experience and societal values, norms and knowledge is also required. Dewey's views on the importance of links between individuals and society have been echoed more recently by Wenger (1998) who refers to these group exchanges and the norms and knowledge held by a societal group as a 'community of practice'.

We all belong to communities of practice. At home, at work, at school, in our hobbies – we belong to several communities of practice at any given time, and the communities of practice to which we belong change over the course of our lives. In fact, communities of practice are everywhere. (Wenger, 1998: 6.)

A community of practice can be described as a process for learning in groups, and within the context of this project the ‘group’ refers to a would-be professional community of student teachers. Within a community of practice each participant brings his or her own knowledge, which as Gheradi and Nicolini (2000) explain, when shared becomes part of the community’s knowledge, and with it the implication that the sum of which is greater than the sum of the individual participants’ knowledge.

During this research study a student teacher ‘community of practice’ was created that consisted of the PGDE cohort of students sharing a common educational interest and which engages in a collective learning process through the use of the VLEs discussion forums. By interacting within this community of practice the student teachers were given the opportunity to engage with other students on the PGDE course, where they exchanged coursework information and experiences from school and developed their practice through a professional dialogue within the discussion forums, and thus engaged in a ‘professional socialisation’ (Weedman, 1999). The concept of ‘community of practice’ is a very appropriate theoretical concept to adopt on this research project, because it provided not only an important basis on which to investigate the group dynamics of computer mediated communication, but also provided a basis on which to examine the notion of ‘professional socialisation’, which is described in greater detail below.

The influence of the technology on the interactions in computer mediated communication should also be considered and this leads to the third theoretical concept that is adopted on this project - situated learning. Lave (1988) describes how situated learning is a constructivist approach that acknowledges that learning is most effective when it occurs at the time and place in which the actual tasks are performed. Learning is participatory and the important elements are both the activity and the social arrangements in which the activity takes place (Wenger, 1998). Situated learning takes place in the discussion forums through the student teachers' participation and interaction with each other, where the students collaborate, jointly problem solve, learn together and shape not only their own learning and development, but the development of the on-line community of practice as well.

Consequently, the theoretical framework used in this research consists of three elements that illustrate the importance of constructivist interaction:

- Social and cognitive constructivism;
- Communities of practice;
- Situated learning.

These three concepts are discussed in greater detail below.

Social and cognitive constructivism

Constructivism is a theory that describes learning as an active process (Johnson 2001; Piaget, 1932), where learners construct their own knowledge based on their own present and past knowledge and experience (Brooks and Brooks, 1995; Crowther, 1998). The on-line discussion forums provide the environment for the student teachers to interact in an

on-line dialogue with their peers. Within these forums the student teachers learn through a collaborative process of constructivism, where their communication is scrutinised and frequently challenged by their peers, where their ideas are formulated, developed and constructed through an on-line dialogue with the other participants of the forums.

Constructivism within these forums focuses on a learner-centred approach that draws upon the elements of open-ended questions, learning by doing, teamwork, negotiated learning goals, cognitive tools and learning facilitators (Austin *et al.*, 2003; Johnson, 2001).

Two different types of constructivism that are relevant to this study are: cognitive constructivism (Piaget, 1970) and social constructivism (Vygotsky, 1978). Although these two forms of constructivism have many similarities, the key difference lies in their view of knowledge construction. In cognitive constructivism the learner constructs knowledge through a reflective process by reorganising personal experience and cognitive structures (Von Glaserfeld, 1989). In social constructivism knowledge is constructed through social interaction, where the stimulus is the interaction that occurs between participants.

These two categories are not mutually exclusive and both of these types of constructivism are relevant to communicating within a VLE discussion forum. For example, learners engaging in cognitive constructivism reflect on the messages they read in the on-line discussion forums and reach new levels of understanding through a reflective process, and then engage in social constructivism by testing this new level of understanding through communicating it to others and then refining and modifying their new knowledge in response to the feedback they receive from the on-line community. Vygotsky (1978) describes learning as a social, collaborative and interactive activity where the teacher provides the necessary 'scaffolding', in the case of this research the activities within the on-line discussion forums, and sets up the learning situation that allows learning to occur. The teacher encourages the students' ability to think for themselves, for example through

the development of the students' reflective capacity, and encourages them to take responsibility for their own learning (Kramarski, 1999).

Communities of practice

Wenger (1998) describes a community of practice as a process for learning in groups, where participants bring their own individual knowledge which when shared becomes part of the community's knowledge. An important function of such a community is the provision of opportunities for the participants to communicate, discuss and exchange ideas (Gheradi and Nicolini, 2000), with a key concept of communities of practice being the community knowledge of the group. During the last ten years there has been an increasing interest in creating e-learning environments to support communities of practice (Austin, 2006; Kim, 2000; Schlanger and Fusco, 2003; Schwen and Hara, 2003). A characteristic of these communities is a shared commitment for a particular practice that creates a dynamic network, which promotes knowledge sharing and professional development (Wenger, 1998). An important function, therefore, of a community of practice is to provide the participants with opportunities for discussion. Rogers (1996) describes how successful communities of practice encourage participants to draw on the knowledge and expertise of others and encourage the participation, reflection and development of its members.

A group of students that participate in an on-line forum discussion, as for example on this research study, are in essence a 'community of practice' (Lave and Wenger, 1990). For example, Barab *et al.*'s, (2003) description of a community of practice is as follows:

A persistent, sustained social network of individuals who share an overlapping knowledge base, set of beliefs, values, history and experiences focused on a common practice and/or mutual experience. (Barab et al., 2003: 255.)

Communities of practice typically develop over a period of time, evolving according to the requirements and needs of the group (Squire and Johnson, 2000), and promote interaction and learning through the communication of their members.

Wenger (1998) describes a community of practice as a process for learning in groups, one that arises out of a necessity to accomplish tasks. A community of practice attracts participants around common interests (Hargreaves and Goodson, 2006), which within the context of this research attempts to assimilate student teachers into the teaching profession and educate and prepare the student teachers for new practices and fields of work. A community of practice can help the student teachers to develop the necessary skills and practices of the teaching community by facilitating interaction with other student teachers and by giving them opportunities to communicate their experiences from 'teaching practice' in their schools. For qualified teachers these communities have traditionally focused on interaction within the school, particularly the staffroom; however, the advances in technology in recent years have given rise to a growth of on-line communities. Teachers are now able to be members of their localised communities of practice and also link with other communities on a national and international level (Laferriere *et al.*, 2006).

Situated learning

Lave (1988) describes situated learning as the learning that takes place through participation, where, for example, participants are quick to appreciate the rules of engagement and 'netiquette' of on-line discussion forums, and at the same time experience

a sense of expectation and a sense of how they should act in relation to their on-line tasks and towards other participants. Lave and Wenger (1990) describe how situated learning is closely related to social interaction in an active group context. This highlights the importance of active participation in the on-line discussion forums, and seems to suggest that the tutors should carefully plan and structure the on-line activities and the social exchanges to maximise the situated learning that takes place. However, Brown *et al.* (1989) argue that not only is the situation in which knowledge is created a central part of the learning process, but that the learning that occurs can often be incidental and unplanned rather than deliberate. Brown *et al.*'s (1989) argument identifies a characteristic of situated learning that is very often a feature of independent learning. For example, the tutor might initiate a task or communication exercise, but the discussion within the forum could easily move into other areas and cross boundaries that the tutor hadn't originally intended. This can provide significant advantages, because situated learning draws upon the social energy that is generated from the interaction within on-line discussion forums. Participants of these forums can collaborate, share stories and experiences, and can learn together and shape not only their own development but the development and identity of the on-line community they are communicating with.

It is important to include this concept within the theoretical framework of this project, because it highlights how objects, tools, people and environments can influence the process of learning. The student teachers' on-line interaction via the computer screen and the supporting software and the dynamics of the human – computer interaction (HCI) are a significant component in both their interaction and learning, which needs to be considered carefully.

Constructivism focuses on learning as a process of constructing knowledge by an individual, where the learning style is not the traditional instruction focussed approach, but a student-centered learning and teaching style (Piaget, 1970). Constructivism in this research involves the student teachers constructing their own knowledge through their reflective interactions with other participants in the on-line discussion forums.

Situated learning, as identified by Lave (1988), is a constructivist approach that acknowledges learning is most effective when it occurs in the context in which the knowledge is created and used. Wenger (1998) describes how this learning takes place at the time and place in which the actual tasks are performed. Learning is participatory and important elements are both the activity and the social arrangements in which the activity takes place. Knowledge within this context is viewed as a relation between the individual student teacher and the social environment of a discussion forum (Orey and Nelson, 1997). In order to gain knowledge the student teacher must actively participate within the social environment, or community, which can be described as a community of practice (Wenger, 1998).

A community of practice has been described by Wenger (1998) as a process for learning in groups, one that arises out of necessity to accomplish tasks and provide paths for learning. Communities of practice promote learning via the communication of their members and the student teachers learn by participating in the on-line discussion forums. A key concept of a community of practice is community knowledge. The student teachers bring their own individual knowledge to the community which when shared becomes part of the community's knowledge, with the sum of the community's knowledge being greater than the sum of the individual students' knowledge (Gheradi and Nicolini, 2000).

The three components of constructivism, situated learning and communities of practice provide a theoretical framework for this research study. A common thread running through these components is a concern for the mediated nature of knowledge, with the suggestion that knowledge is participatory and culturally constructed (Vrasidas and Zembylas, 2004).

Research platform

NUI Maynooth is Ireland's second oldest university institution tracing its roots back to 1798. The university currently has over 6,000 students and a range of disciplines which include the traditional faculties of humanities, music, education, science, computing and electronic engineering.

NUI Maynooth has a large Education Department that offers a range of courses for school teachers and trainee teachers. The particular course that is relevant to this research is the Postgraduate Diploma in Education (PGDE). This is a full-time course and is the initial teacher education programme followed by the majority of those seeking a career in post-primary teaching in Ireland, similar in many respects to the Post Graduate Certificate in Education (PGCE) teacher training course in Northern Ireland, England and Wales.

The student teachers regard the PGDE course as both a challenging and stressful experience. This is due in part to the exacting and dual demands of both the college and the co-operating school. The students are expected to demonstrate a professional capability and curricular knowledge in school and attain the high academic expectations placed on them by the university.

Approximately 160 students are enrolled on the PGDE course each year. These students are all given access to the university's VLE, which allows them to access lecture notes, assignments and resource materials provided by their lecturers and participate in various discussion forums.

The next chapter contains the results of a search of the published literature, and provides a synthesis and critical review that relates to the theoretical framework and research questions described in this chapter.

The pattern of higher education has for centuries been to draw students and scholars into central locations to meet like-minded individuals, academics and to access centrally held information in libraries. However, in recent times the storage of information has become decentralised as libraries have converted from providing tangible information products to providing access to electronic media that are available to lecturers and students off-campus across networks spanning national and international distances. This development has been made possible with the rapid developments in technology, such as the provision of high speed Internet access and the growth in university networks. Before technology became widespread people had to come to the information, whereas now information and communication technology is almost universally available and so it is possible for the information to come to the people; this change has had a significant effect on higher education institutions. Growing numbers of colleges and universities use this decentralised model of information delivery to either partially or wholly present courses, and typically refer to them as ‘e-learning’ courses.

The provision of well-designed, effective and efficiently delivered e-learning courses has been seen as a solution to providing lifelong learning, continuing professional development and meeting the demands of growing numbers of adult learners (Daugherty and Funke, 1998; Palloff and Pratt, 2001). Colleges of higher education have been quick to see the potential e-learning courses offer in increasing their student population without necessarily placing additional burdens on their campus facilities. Governments and influential organisations have also exerted an influence; for example, one of the recommendations from the Organisation for Economic Co-operation and Development (OECD) review of Higher Education in Ireland (2004) was the development of e-learning courses.

Consequently, many colleges and universities now offer distance learning courses that utilise a mix of on-line learning web sites, using course management software (CMS) and virtual learning environments (VLE), with reduced requirements of attendance on campus.

However, some academics are sceptical of such practices and regard the potential benefits of e-learning as over-stated and utopian (Clark, 1994; Furnell *et al.*, 2000). Questions regarding the effectiveness of e-learning are very much in evidence in the literature. Some researchers question the pedagogical soundness of e-learning which they claim has yet to be investigated fully and state there is little empirical evidence to support claims of its effectiveness (McElhinney and Nasseh, 1999; Noble, 2002; Reeves and Reeves, 1997; Speck, 2000).

Critics of e-learning methods typically describe the benefits of the social interaction between students attending a course on-campus that is based on face-to-face contact with tutors and other students, and how it can offer a rich, dynamic and beneficial platform for learning that is satisfying and rewarding for both the student and tutor that is difficult to replicate on e-learning courses (Clark, 1994; Furnell, *et al.*, 2000). However, supporters of such systems describe how the use of e-learning tools can facilitate a more accessible and convenient platform, that can potentially widen the access to education to students unable to attend a campus based course (Garrison and Anderson, 2003).

This chapter examines the effective use of a particular component of contemporary e-learning courses - computer mediated communication.

What is meant by the term e-learning?

There are a wide range of different meanings associated with the term e-learning; it has been described as the ‘use of electronic technology to deliver, support and enhance teaching and learning’ (Learning Technologies, 2003). Harasim (1989) describes e-learning as the delivery of learning materials via electronic media; for example, the Internet, intranets, extranets, satellite, audio/video tape, interactive television and CD-ROMs. Garrison and Anderson (2003) believe e-learning is facilitated through electronic on-line network technologies, although they also mention this does not preclude other technologies or approaches, and they also highlight the value of including traditional elements such as face-to-face educational experiences. The American Society for Training and Development defines e-learning as a

wide set of applications and processes such as Web-based learning, computer-based learning, virtual classrooms and digital collaboration.

(<http://www.astd.org/astd>)

These definitions highlight the considerable ambiguity and widely varied conceptions that frequently surround the term e-learning. The ambiguity arises because the term e-learning is used to describe a broad range of very different activities.

Users of the term e-learning also seem to be adapting it to cover new meanings. For example, the e-learning description of Harasim (1989) mentioned above, where e-learning means the delivery of learning materials via electronic media, has evolved to incorporate more than just electronic media, and where the ‘e’ in e-learning is used to describe ‘enhanced’ or ‘experiential’ learning. Reynolds *et al.* (2002) describe how these alternative definitions of ‘electronic’ reflect a school of thought that believes it is not the

electronic nature of e-learning that defines this type of learning, but instead the opportunity to integrate working, learning and community together. This implies a definite change in emphasis from a behaviourist model of e-learning, that involves the learner and the subject content of the course, to a constructivist one that incorporates situated learning within on-line communities of practice.

The literature reveals marked differences between e-learning courses, particularly in regard to the teaching and learning methods they adopt. In an attempt to determine a better understanding of the term e-learning, it has been helpful to group e-learning courses into three distinct types (Reynolds *et al.*, 2002):

- Web-based training;
- support on-line learning;
- informal e-learning.

These three groups are all commonly referred to as e-learning, yet they encourage very different kinds of learning experiences and serve very different purposes. For example, web-based training typically involves accessing web pages, reading the contents and following exercises; it was used on early e-learning courses and encourages a behaviourist style of learning.

The main objectives of the first and second generation systems have been the production and distribution of teaching/learning material to the learners.

Communication with the learners has been marginal, and communication amongst the learners has been more or less non-existent. (Nipper, 1989: 63.)

Supported on-line learning was a later development from the ‘first and second generation systems’ mentioned by Nipper (1989) and focuses on tutor-student and student-student communication utilising a more constructivist approach, where the learning is ‘constructed’ as a result of the interaction and communication between the participants. Supported on-line learning draws upon the distributed learning models that are ‘situated’ and involve communities of practice. These three e-learning classifications are explored further below; however, contemporary e-learning courses do not fall neatly into any one of these classifications. Elements from each classification are very often evident within a single e-learning course.

Web-based training

Some definitions of e-learning, particularly evident in the commercial training and industrial sectors, describe a model of computer based training transferred to Web pages on the Internet, with the emphasis being placed on the electronic nature of the content. Some courses store the Web pages on CD-ROMs, to deliver distance-learning course material, course information and coursework assignments as an alternative to storing them on the Internet, to increase accessibility and to avoid connection problems.

Web-based training was popular during the 1980-90s and although web-based materials are no longer used as the focal point of most contemporary e-learning courses, this legacy is still very much in evidence today. Young (1998) describes how Web pages make it easier to distribute materials to students and how they are available to the students as and when they need them. This was an important function of using Web pages on a Web-based training course; they were used to provide an on-line version of the traditional paper ‘handout’, allowing a variety of text and graphical formats to be viewed many times during the course. Currently, Web pages are used on e-learning courses as ‘gateways’ or ‘portals’

that provide access, through the use of numerous hyperlinks, to various course materials such as syllabi, class notes and review materials and also for providing interaction, involvement and the engagement of the learners (Shotsberger, 1996). However, it should be noted that the interaction that is referred to here is not a dynamic communicative interaction that might be witnessed in a dialogue between individuals, but the interaction between an individual and the content of a web page (Filipczak, 1995; Shotsberger, 1996).

The traditional Web-based training pages of the 1980-90s were not used as 'gateways', but were used to contain text and diagrams that provided a visual description or explanation of a topic. These Web pages were used to encourage active enquiry-based learning by using multimedia information and allowing connection to further Web pages and resources by providing hyperlinks between pages. The use of hyperlinks helped to facilitate the students' learning by allowing them to explore interests and questions they might have around the content of the Web site as and when they were prompted by the content material. Typically the text would have numerous key words underlined, or in a different colour to the rest of the text, which signalled a hyperlink to a further page containing additional information.

Web pages of this kind are currently being used on Wikipedia, the on-line encyclopaedia, shown in figure 2.1. The hyperlinks in this figure are the words and sentences in blue, and they make up a large portion of the page content.



Figure 2.1 An example Wikipedia webpage, showing hyperlinks.

(<http://en.wikipedia/wiki/education>)

Web-based courses typically adopt a behaviourist model of learning, where learning is focussed on the content and stimuli presented on the Web pages and demonstrated by the students' responses in tests and evaluation exercises. Typically, this involves drill and practise exercises that measure behaviour changes to confirm the learning that has taken place. The behaviourist model is one that is largely inappropriate for this research project because the learners in a behaviourist model are largely passive and do not specifically engage with higher order functions, such as analysis and reflection. The student teachers that are the focus of this research were encouraged by their lecturers to become active, reflective practitioners and to adopt a constructivist learning approach as opposed to a behaviourist one.

Research studies that have addressed the behaviourist learning outcomes from Web-based e-learning courses have found no significant difference in grades obtained from traditional face-to-face classrooms and those from virtual classrooms. However, comparing the grades obtained from these two approaches is not necessarily the most effective way of assessing the learning that has taken place. Undertaking a course of study involves significantly more than just achieving specific course learning outcomes and good grades. For example, the grades obtained by the students from assignments and examinations invariably do not accurately portray the personal development and progress that the student might have made. Hiltz (1993) conducted a study to compare undergraduate experiences between face-to-face and on-line course delivery; her statistical analysis revealed “variables in outcome were much more affected by differences in student characteristics, course characteristics and the institutional environment, than by mode of course delivery.” Other variables that perhaps should also be considered in a comparison of this nature are the learning style of the course and the requirements and demands of this style on the learner. Hiltz’s analysis raises a significant point, which is that a course’s learning objectives might not reflect fully the complete learning that has taken place, and that any analysis comparing different courses, such as traditional face-to-face courses with e-learning courses, needs to address the holistic learning experiences of the students.

Support on-line learning

The higher education sector views e-learning differently to the commercial and industrial sectors, in that the emphasis is not placed on the delivery of electronic content, where the learner is required to acquire skills and information, but on its communicative potential; students in third level education are required to reflect on their learning experiences and analyse, evaluate and synthesise information. Within the context of higher education, e-

learning means electronic access and interaction with learning materials, other students and tutors or e-moderators (Salmon, 2003).

Archived messaging systems are an important component of support on e-learning courses and are used frequently as the central method of communication between student-to-student and student-to-tutor. These systems are characterised by their ability to create and retrieve text-based messages, coupled with an archiving system that allows messages to be stored and reviewed over a period of time. Text-based conferencing includes such tools as newsgroups, bulletin boards, chat rooms and e-mail systems and are either synchronous, occurring instantly or in real-time, or asynchronous, where messages are stored and read at a later time.

An example of a forum used in NUI Maynooth is shown in figure 2.2. This figure shows how each message is time and date stamped and includes the contributing author's name. This particular forum is restricted to students of a tutorial group, and is only accessible to members of this group.

The screenshot shows a Moodle forum interface. At the top, the header includes the NUI Maynooth logo and the text 'moodle', 'Oiliúcal na hÉireann Mhá Nuad', and 'PGDE Forum'. The breadcrumb trail reads 'moodle > NCEDHD-26 > Forums > Nigel's Tutor Group > Introductions'. There are two search boxes: 'Display replies in nested form' and 'Move this discussion to...'. The forum title is 'Introductions' by Nigel Quirke-Bolt, dated Tuesday, 11 September 2007, 02:52 PM. The content of the forum is as follows:

This forum is for you to introduce yourself and to practice communicating online.

Re: Introductions by PADRAIG - Wednesday, 12 September 2007, 10:44 AM
 My name is Pádraig . Im from Monagea in West Limerick. I Play Hurling and Football with my Parish at home. Im Interested in Traditional Music and I play the Button Accordion
[Delete](#) | [Reply](#)

Re: Introductions by MONICA - Wednesday, 12 September 2007, 10:45 AM
 Hey Padraig .How are you?Are ya enjoying your course so far?
[Show parent](#) | [Split](#) | [Delete](#) | [Reply](#)

Re: Introductions by PADRAIG - Wednesday, 12 September 2007, 10:47 AM
 Im grand no fear of me? yeah its grand no bother. You?
[Show parent](#) | [Split](#) | [Delete](#) | [Reply](#)

Re: Introductions by MONICA - Wednesday, 12 September 2007, 10:43 AM
 Hey!My name is Monica . I am from Swanlinbar in Co.Cavan and I`m currently doing the PGDE course in Maynooth.
[Show parent](#) | [Split](#) | [Delete](#) | [Reply](#)

Re: Introductions by PADRAIG - Wednesday, 12 September 2007, 10:46 AM
 Monica,
 What are your subjects?

Figure 2.2 An example of a conference forum used in NUI Maynooth.

Archived messaging systems are used widely on e-learning courses and most e-learning courses use some form of computer mediated communication. Shaw and Polovina (1999) describe how textual communication often becomes the most important link between the students and the tutor on e-learning courses. Other means of communication are used such as tutor-to-student telephone calls and letter writing. Telephone calls are usually only used when communication within forums is inappropriate, such as when dealing with specific problems that involve a lengthy dialogue or the rapid exchange of information or views, and letter writing is frequently used at the start of a course, or to formally communicate with a student. The development of various technological systems has led to a rise in other forms of communication such as group telephone conversations, and the introduction of fast broadband Internet connectivity has led to improved communication, for example through video-conferencing (Austin *et al.*, 2003). However, because the students in this research project attended the campus neither of these developments are used in this project

and archived messaging communication is the most important link between the student and the tutor outside of lectures and tutorials.

Computer forums can be used to disseminate information amongst students attending a course. Hiltz and Weldman (1997) describe an example of using an e-learning course to encourage communication where students submitted assignments to a computer forum so that their peers could read them. Many students reported how this increased their motivation and 90% valued this opportunity. Circulating student assignments to everyone attending a course can present a variety of expensive logistical problems, particularly when large numbers of students are involved. Using computer mediated communication can provide certain advantages over traditional courses, such as in the above example, greater access to communication and a broader distribution of information. This latter point was evident in the research carried out in higher education by Hiltz and Weldman (1997); they described how the students' understanding of course material on an on-line course equalled or exceeded their understanding from traditional approaches.

An important potential learning outcome of students' communication through computer mediated communication is the conceptual growth that the communication between collaborating learners encourages (Howe *et al.*, 1992). Piaget (1932) described how learning could take place through a discussion that involves a disagreement, where the participants are required to articulate, critique and defend their ideas against each other. This view was supported by the work of Doise and Mugny (1984) who described how conceptual growth occurs through developing existing ideas and thoughts with new items of information and formulating a further understanding, which resolves the initial argument or difference of views. These discussions can arise between students with varying ideas and opinions, or for example with a single student experiencing conflict with ideas presented by the course material. Computer mediated communication has been described

as the ideal medium to maximize the positive effects of argument and conflict (Johnson *et al.*, 2000; Light *et al.*, 1997; McNeill, 1992; Nalley, 1995; Steeples *et al.*, 1994; Wilson & Whitelock, 1998); because the communication is carried out over a distance and is asynchronous. This provides the students with a safe sense of distance from the disagreement and also provides the additional time to re-read and reflect on the messages of others with the extra time to carefully reflect and formulate their own individual response.

Informal e-learning

Informal e-learning is the learning that takes place from the interactions between people and organisations (Reynolds *et al.*, 2002). Learning occurs from the experience of coming into contact with others through information technologies (Austin and Anderson, 2008), as they engage in information retrieval and knowledge construction. This method of learning, through on-going practice, draws upon the social energy that is generated through interaction in joint enterprises and is referred to as 'situated learning' (Lave, 1988) and is often associated with the participation and interaction found within a community of practice (Wenger, 1998), which is discussed in more detail below.

The PGDE course (described in Chapter One) that is being used within this research project utilises the characteristics from all three models described above. The Education Department in NUI Maynooth provides an on-line area for each course, and each course has a home page that contains a number of links to various activities and resources, in much the same way as the Web page portal described above in a Web based training course. This feature allows the course administrators and tutors to include links to handouts, exercises, course activities and assignments, and provides the students with a

central on-line area from which all the course materials and resources can be obtained.

Figure 2.3 shows a typical on-line home page for a course in NUI Maynooth.

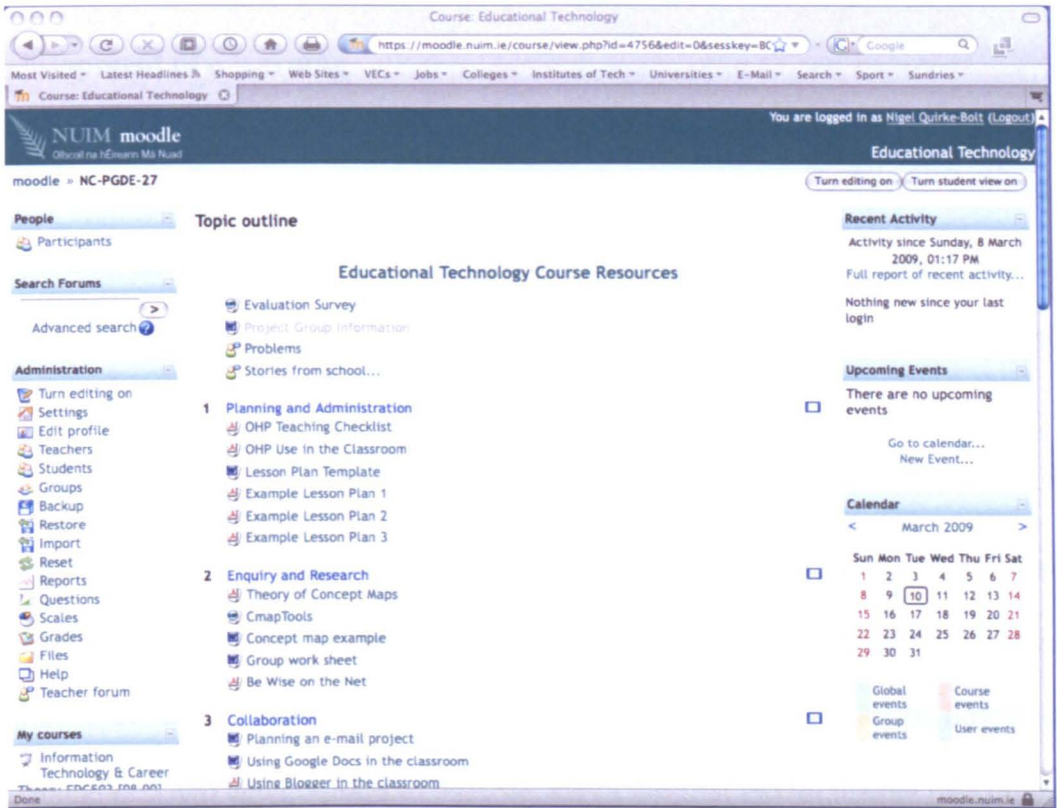


Figure 2.3 An example of an on-line home page used by a course in NUI Maynooth.

In addition to containing various links the course home page also contains numerous forums to facilitate interaction, as described in the ‘support on-line learning’ section above, between the university and student, student to tutor, tutor to student and student to student interaction. These forums are provided to facilitate an opportunity for the students to engage with tutors, students and course materials and develop a deeper understanding of the topics and issues that are covered and that arise from their work on the course, and the extent of the reflective practices within these forums is of particular interest to this project. Another area of interest of this research is the experience of learning on-line and the

‘situated learning’ that is generated from the on-line social interaction, and the opportunities this presents to develop the student teachers’ professional socialisation.

The development of e-learning

The previous section looked at the three main types of e-learning, this section addresses how e-learning has evolved from a pedagogic perspective, and charts the development from the early days of computer based instruction to the growth and popularity of virtual learning environments.

Garrison and Anderson (2003) describe how e-learning traces its roots back to 1959 when the University of Illinois developed a training product called PLATO (Plato Learning, <http://www.plato.com/aboutus/index.asp>). Alessi and Trollip (1985) describe how this system integrated text and graphics to provide one of the first environments for computer based instruction. In the late 1970s and early 1980s the Control Data Corporation organisation (<http://www.cbi.umn.edu/collections/inv/cdc/cbi00080.html>) used the PLATO system to deliver training to its employees throughout the world. This training system used the computer to provide instructional sequences followed by drill and practice exercises and was frequently referred to as ‘computer based instruction’ (CBI).

CBI applications were called ‘programs’ and were similar in structure to other forms of computer software. Pointe (1985) describes how his design considerations for CBI systems focussed on the structure of the software program (sequential, command or menu), with very little consideration given to pedagogic considerations. The teaching approach at this time was strongly influenced by behaviourist educational theory and largely led to the development of mechanistic educational systems, where the emphasis was placed on students achieving specified objectives and acquiring specific skills. The students were not

required to engage in reflective practices and develop higher order thinking skills (Bloom, 1956).

Concerns with the learning processes and strategies of CBI were expressed by Hannafin and Peck (1988). They modified the CBI model by recognising that computer technology should not be the main vehicle of instruction and adopted the term 'computer assisted instruction' (CAI). This development recognised the pedagogic limitations of basing the learning experience solely on the students' interaction with a computer screen, and that computer instruction should only be one component amongst others. In contemporary terms this would now be referred to as 'blended learning' (Reynolds *et al.*, 2002), where a variety of teaching methods and approaches are used within the one course or training programme. However, it is important to recognise that the development of CAI systems sprung from an understanding of the limitations of an over reliance on technology and Web-based training. CAI used the computer in the same way as CBI, the important difference was that in CAI the learning experience of the student was broadened to include a variety of other instructional approaches, which were not solely based on working from a computer screen; for example, an activity might be introduced on the computer screen which then led to the learner completing it away from the computer.

The CAI approach still relied on behaviourist approaches, but also benefitted from the influence of cognitive psychology. This was seen during the micro-computer revolution of the late 1980s when educationalists became increasingly involved in the production and development process of CAI (McPherson and Nunes, 2004), as they began to appreciate the potential that technology could offer both themselves and their students.

Improvements in technology, such as the increased availability of fast multimedia desktop computers, in which visual elements could be accessed and displayed on high resolution computer screens, were utilised to provide learners with a dynamic and highly visual

learning environment. Increasing numbers of educators began to appreciate the pedagogic value of using technology as a teaching tool, and research carried out at this time supported the use of visual media for learning, where it was recognised that the majority of people learnt more effectively through visual means rather than, for example, through audio such as listening to a teacher's voice (Jensen, 1995; Sousa, 1995).

During the 1990s technology continued to develop rapidly and, coupled with the development of more interactive CAI systems and the availability of affordable and high specification personal computers, led to the creation of 'computer based training' (CBT) products. CBT involved the presentation of text and graphics, often stored on CD-ROMs, and the provision of an element of interactivity between the user and the content. This enabled the learner to make a number of choices in their navigation of the training materials depending on the level of knowledge and training requirements (Vogel and Klasson, 2001). Aldrich *et al.* (1998) explain how CD-ROMs help to encourage cognitive interactivity between the student and software rather than simply a physical interactivity, because the student could engage in interactive quizzes and simulations rather than simply pressing buttons and navigating from one Web page to the next, although contemporary Web pages are now able to provide everything that CD-ROMs can. Computer based training adopted a constructivist method of learning, that was based on what cognitive psychologists called 'sensation' and 'perception' (Gross and McIlveen, 1997) to distinguish what our senses receive and what we actually perceive, which involved the learner in analysing and making judgements based on their interpretation of visual information.

The 1990s saw the explosion of the World Wide Web and a range of Internet technologies, such as e-mail and local and wide area networks. At this time the traditional behaviourist approaches to learning were questioned and the emphasis on educational courses began to

change to provide the learner with a rich rather than a minimalist environment (Perkins, 1995). Educationalists began to consider learning as being 'situated' (Brown *et al.*, 1989) where knowledge was not just considered an individual acquisition but something that resides in groups or communities that share the same situation (Damarin, 1993). The World Wide Web was seen to create 'learning communities' (Lin *et al.*, 1996) and hypertext and hypermedia helped to contribute to the restructuring of the learning environment, drawing upon constructivist ways of learning that were embedded in cognitive and social contexts (Relan and Gillani, 1997).

The rapid expansion of Internet and network technologies has led to the development of integrated networked learning environments known as virtual learning environments (VLEs) (McPherson and Nunes, 2004). Barajas and Owen (2000) define a VLE as an

on-line domain allowing both synchronous and asynchronous collaborative interaction among teachers and learners. That provides any combination of distance and face-to-face interaction, where some kind of time and space virtuality is present. (Barajas and Owen, 2000: 40.)

This definition of a VLE is perhaps too general to explain how they are being used in this research project. VLEs should be thought of first and foremost as a learning environment, where the 'learning' drives the activity that is carried out. The word 'virtual' refers to the technology that is utilised to support the learning, and the 'environment' that is created by the technology is a location within a computer network, which means the 'environment' is a space that doesn't exist in the physical world, but exists in the 'virtual' world of the computer network.

VLEs have become increasingly popular in higher and further education. McPherson and Nunes (2004) explain this is because they can be used to electronically distribute course materials and communicate information between course administrators, tutors and students through the use of notices and discussion forums. More cynical observers of the use of technology (Barajas and Owen, 2000) believe they have become popular because of the perceived savings in cost; for example, moving course materials from paper to an electronic format reduces paper and photocopying costs, and providing computer mediated communication such as discussion forums reduces the need for student-tutor meetings. The accessibility potential and time and space flexibility of VLEs have been strong selling points and these advantages are frequently mentioned in the literature; however, the literature also revealed the need for caution in assessing the educational value of a VLE. For example, the expectations surrounding the use of VLEs are often overly enthusiastic, it should be remembered that with any technology used in teaching and learning, VLEs have no intrinsic educational value in themselves, it is the way in which on-line courses and on-line activities are designed and delivered that adds value and increases their effectiveness (Barajas and Owen, 2000). These concerns raise interesting questions for this research study, such as, are we expecting too much from technological systems such as VLEs? How effective are VLEs as a communication medium on a course of higher education?

Popular proprietary brands of VLEs used in universities include WebCT (<http://www.webct.com>), BlackBoard (<http://www.blackboard.com>) and Moodle (<http://www.moodle.org>). WebCT and Blackboard were both developed in the United States and were purchased by many third level colleges in Europe. Moodle was developed in Australia and is available as Open Source software, making it available free of charge with the flexibility of allowing users to develop and enhance it to suit their own requirements and applications. However, all of these proprietary brands are very similar

and offer more or less the same features, although, the no-charge element of Moodle has resulted in significantly more educational institutions choosing this software.

Regardless of which brand of VLE is used they can all be restrictive, in that they all offer a fixed presentation format with only a limited number of features such as forums, resource areas and chat rooms. However, they can provide a familiar and functional environment for the course designer and teaching staff to provide a simple and efficient platform for the students to interact with the content and activities of the course of study (Milligan, 1999). McPherson and Nunes (2004) describe how VLEs can be used to encourage constructivist learning outcomes and provide scaffolding for the interaction between students and learning materials, student-to-student and student-to-tutor, although it should be noted that it is not necessarily the VLE environment *per se* that is the deciding factor in encouraging this constructivist learning, but the features of the VLE that are incorporated and integrated into the tutor led activities have a greater influence (Milligan, 1999).

VLEs provide a range of on-line course management tools that allow tutors to keep track of student activity and progress. The tutor is able to provide scaffolding and support for the student, encouraging reflection and group networking, whilst also monitoring the quality and quantity of the students' communication, learning and participation.

A question that is frequently asked is how does a VLE change the nature of learning? This question is explored in more depth below, but one aspect where a VLE can change learning is the provision of multimedia elements. Considerable research has been carried out that demonstrates how vision is the dominant sense modality in people (Gross and McIlveen, 1997; Jensen, 1995; Sousa, 1995) and that interacting with visual elements engages people more actively than when using non-visual media. VLEs are becoming increasingly

versatile and students are able to experience images, sound, video and animation files, at times they choose to, and so enhance their learning experience.

Computer mediated communication

A key component of VLEs are their provision of computer mediated communication opportunities. Computer mediated communication can be described in broad terms as any form of communication between two or more networked computers, which allows participants to transfer messages using computer mediated formats (McComb, 1994), such as e-mails, forums, instant messages, chat rooms, bulletin boards, network video-conferencing and blogs (Romiszowski and Mason, 2004).

Research on computer mediated communication first began in the 1970s. Vallee and Johansen (1974) examined the effectiveness of computer conferences and forums, in supporting interaction and the effectiveness of users' sense of personal contact with each other. They found that forums provided moderate to good levels of social awareness and support for the social dimension of work. However, subsequent research has resulted in widely differing claims regarding the effectiveness of this form of communication. Claims have ranged from the enthusiastic converts who describe communication networks of vibrant and strong egalitarian relationships that are not hindered by visual cues such as sex, race, social grouping or disability (Harasim, 1989; Henri, 1995), to the more cautious users who believe this form of communication is only appropriate in the most straightforward and specific transmission of factual information (Vallee and Johansen, 1974). The variety of claims that are made about computer mediated communication highlight the lack of clarity in identifying the salient elements of this medium, a point that is taken up by Mason and Romiszowski:

The most glaring omission in CMA research continues to be the lack of analytical techniques applied to the content of the conference transcript. Given that the educational value of computing conferencing is much touted by enthusiasts, it is remarkable that so few evaluators are willing to tackle this research area.

(Mason and Romiszowski, 1996: 443.)

Despite this lack of clarity the growth in computer mediated communication in higher education has been striking (Tolmie and Boyle, 2000). Colleges have been quick to appreciate the potential of such systems and have used them to overcome the problems of widely dispersed student populations (Kaye, 1992; Daniel, 1996), increased student numbers (Pincas, 1995) and the belief that they help to promote student discussions and engagement (Kaye, 1989; Harasim, 1989; Odasz, 1992; Bates, 1995; Henri, 1995). NUI Maynooth encourages their students to use computer mediated communication, such as individual and group messages to discussion forums in a VLE, as a means of contacting their tutors and lecturers. This helps the teaching staff to communicate with their students at a time when it is convenient for them, rather than at the time when they are approached by the student. The communication between the student and the teaching staff can be either private or public. Frequently, tutors will post their answers to questions in a public forum, particularly if they think the answer is applicable to other students, in much the same way as a list of 'frequently asked questions' might be displayed.

If academic staff are to use computer mediated communication, as mentioned above, to support and communicate with their students then this requires a shift from the traditional third level teaching style (Salmon, 2002). Previously academic staff transmitted information and communicated with their students in the lecture hall, however, using this new technology changes their role to that of a personal mentor guiding and supporting students through the process of knowledge acquisition. Barajas and Owen (2000) describe

how within this process the students can take a greater control over their own learning and their expectations, and the demands on the academic staff alter to incorporate increased on-line facilitation and moderating skills. This can create additional pressures on the teaching staff and suggests that a new strategy for teaching is required if computer mediated communication is to be used effectively. The tutors' skills in moderation and contributing within discussion forums has become highly significant (Salmon 2002). Tutors need particular training to use VLEs, in general, and discussion forums, in particular. Effective teaching within a VLE requires not only a technological and organisational competence, but also new skills in applying relevant pedagogic methods.

It has already been seen that the criteria used to determine the effectiveness of computer mediated communication should be based on the context in which it is being used (Laurillard, 1994). The technology on its own is not effective, the key to its success is the way it is integrated into the course programme. The underlying question of this research is whether computer mediated communication is a suitable method of communication for students on a postgraduate course, and whether it can be used in conjunction with more traditional forms of communication. Within the PGDE course at NUI Maynooth there are a number of important elements in the informal social interaction between students that are valued by academic staff. Three key areas are: the opportunities that are afforded to students to discuss, develop and formulate ideas and perceptions on issues arising from the course (Crane, 1972; Hagstrom, 1965; Price and Beaver, 1966; Coser, 1970); the development of their capacity to become reflective practitioners (Schön, 1982); and, the development of their identity and role within the teaching profession, where the students appreciate and engage in the social learning of values, attitudes, beliefs and the language of teaching professionals (Weedman, 1999). Within this context, the criteria that are being used to examine the effectiveness of computer mediated communication as a component and method of communication in this research project are the extent to which it can

support and encourage reflective thinking, and the extent to which it encourages and develops a community of practice and the professional socialisation of the participants.

Factors that influence the success of computer mediated communication.

The literature suggests a number of factors that can influence the success of computer mediated communication, and these are discussed below.

Setting the size of the student group that most encourages group interaction is a factor that has long been considered in face-to-face meetings and should be given equal consideration when planning on-line communication. It is important to have a large enough group to have a certain level of interaction, but too large a group can reduce the individual contributions of members of the whole group. The literature shows that the size of the group involved in the communication is a key factor in encouraging the students to participate and suggests that small groups, of less than twenty, work better than large groups (Isroff and Eisenstadt, 1997; Light *et al.*, 1997; McAteer *et al.*, 1997; Tucker *et al.*, 1997; Wilson and Whitelock, 1998). Kaye (1995) and Steeples *et al.* (1994) found that when large groups of students were formed the students frequently went on to set up smaller private conferences, which suggests that the students prefer to work on-line in smaller groups.

The literature suggests that it is better if the students know each other before they start to communicate in on-line conferences. Lewis (1997) and Levinson (1989) describe the importance of early face-to-face meetings before the students engage in on-line communication. McAteer *et al.* (1997) also found that the use of computer mediated communication was greater when the students were familiar with each other than when they had little or no contact with each other. This highlights the importance of having

face-to-face meetings and various social activities at the beginning of a course, to provide the students with an opportunity to bond as a group.

Light *et al.*, (1997) and Trentin (1997) found that it is significant if students have experienced on-line communication before, and others have described the importance of initial technical preparation and practice (Canning and Swift, 1992; Steeples *et al.*, 1994; Bates, 1995). This highlights that communicating through the use of text, without the use of visual and auditory cues, within a discussion forum is very different to communicating face-to-face, and while it may be relatively easy to contribute to an on-line discussion, communicating a similar message in a forum to one we might contribute in a face-to-face meeting is considerably more challenging. The findings from the work of Light *et al.*, (1997) and Trentin (1997) support this view and their research results lead to the suggestion that the medium of computer mediated communication is not a medium of communication that users find necessarily intuitive to use. However, it should also be noted that VLEs use considerably more user-friendly interfaces now than compared to the ones of the 1990s, and this, coupled with the growing technological experience of students, helps to increase the capability of students to use this form of communication effectively.

The literature shows that if students are to use on-line discussion forums in third level institutions they need to be motivated to use them. Mason and Bacsich (1998) described how leaving students to use on-line conferences voluntarily resulted in them not being used. Levinson (1989) and Riel and Levin (1990) argue that if on-line communication is to be used by students they must have a compelling reason to do so. For example, distance education courses might use computer mediated communication in place of face-to-face tutorials and so allow students and tutors to participate in these discussions at specific times of the day that better suit their own schedules. It is also important that the topics under discussion should be seen to be particularly relevant to the students' progress and

development on the course. Canning and Swift (1992) and McAteer *et al.* (1997) also note that students did not use computer conferences unless they had an explicit reason to do so; for example, one compelling reason might be that participation in computer mediated communication forms part of an assessment that leads to coursework marks. This research project addresses the question of student participation in computer mediated communication, and the motivating factors that encourage their participation, the analysis of the results of which can be found in Chapter Five.

Face-to-face and computer mediated communication

A feature of higher education in recent times has been the growing popularity of on-line courses, although some educators have concerns about teaching and learning in this way. These concerns focus on the rapidly changing nature of technology, the complexity of networked systems and the limited understanding of how much students and educators need to know to be able to successfully work in this medium (Conlon, 1997; Brandt, 1996). Concerns have also been expressed about the quality of education and the effects on standards and the possible commercialisation of education, where the focus is placed on obtaining certificates and qualifications, rather than on the quality of the learning experience and the progress and development of the student's individual capacity, leading to the consequent devaluation of academic awards (Gallick, 1998; Johnson *et al.*, 2000).

Attempts to compare computer mediated communication with face-to-face communication are often discounted (Laurillard, 1994), because of the very different nature of the two environments. In this research project it is not the intention to determine whether one is better than the other, but rather to determine whether computer mediated communication can be used as an effective medium for student teachers to communicate with their tutors and with other students. The evidence from the literature supports the general view that

on-line learning environments in higher education are useful, and appropriate uses of computer mediated communication are often described as particularly useful.

An advantage of text-based conferencing that is frequently mentioned (Collins and Berge, 1995; McComb 1994; Ruborg and Taylor, 1995) is the characteristic of providing anonymity that helps to increase equality amongst students. Users frequently do not feel as inhibited using this medium as they might in a face-to-face meeting. However, as Kiesler *et al.* (1984) noted, this anonymity can occasionally produce anti-social and negative behaviour, and as O'Donoghue *et al.* (2001) pointed out, it is slower than voice communication and engages attention less effectively than a face-to-face session. The equal status of users of computer mediated communication is frequently mentioned in the literature (Austin *et al.*, 2003; Howe *et al.*, 1992; Henri, 1995; Leach, 1996). The characteristics of such systems are that no single entry or posting is given greater merit or has greater weight than any other. Each student has to explicitly describe their thoughts and the basis for their ideas so that its qualities can be determined. The 'trans-active' discussion (Berkowitz and Gibbs, 1983) that encourages articulation, critique and defence of ideas highlights superficial or inadequate understanding and creates a strong incentive for conceptual growth. An ethical concern I have in conducting this research project is that by using computer mediated communication certain groups of students might become disadvantaged, because of their lack of experience or fear in using technology or because of their access to computers and the Internet outside of college hours; this concern is explored in greater detail in Chapter Three.

In comparison with face-to-face communication, computer mediated communication removes the need for participants to respond quickly. Rheingold (1994) argued that because computer mediated communication occurs asynchronously users have time to think and that they are able to project an image of themselves as thoughtful transmitters of

ideas and feelings, and be seen as they would want to be seen. This suggests that users of VLEs develop their own on-line personas, which could feasibly be very different to their physical ones. Many researchers have described the *affordances*, or properties, of computer mediated systems that encourage certain actions or behaviours amongst the users. Harasim (1989) and Kaye (1992), for example, noticed certain personal character changes where the less vocal students in face-to-face meetings became more active contributors on-line, while Trushell *et al.* (1997) and Steeples *et al.* (1994) described that gender inequality issues were less of a problem with on-line communication. The work of Gaver (1992) and Dede (1991), for example, suggests that technologies create environments that influence interpersonal exchanges. These exchanges are encouraged in the forums' characteristics of threaded messaging where a reply to a message is linked to a previous message and a series of linked messages form a 'thread'. On-line discussion forums have basically two types of message, a new one on a new topic or an answer or reply to a previous message; this results in large numbers of messages being replies to or continuations of a previous message. The action of replying to a message is then often the reason someone is contributing to that forum, which can lead to discussions that largely consist of different views and opinions.

Interactivity in computer mediated communication

Most researchers regard interactivity as a key factor in the learning process (Berge, 1999; Kearsley, 1995; Moore, 1989), and within the theoretical framework adopted by this research project the interaction between the participants forms the centre of the educational experience (Austin *et al.*, 2003; Garrison *et al.*, 2001; Harasim, 1989; Hillman, 1999; Moore, 1989; Moore and Kearsley, 1996; Vrasidas and McIsaac, 1999; Willis, 1993).

However, the literature reveals a wide-ranging interpretation of the term ‘interaction’ within the field of computer mediated communication. For example, Vrasidas and McIsaac (1999) describe interaction as the reciprocal actions of two or more participants within a given context, while Kearsley (1995) refers to the instructional strategy that is used by the learning activity. These descriptions are interesting in their difference; they show how technologists and educators can have two very different views in assigning the relevance of interaction to this form of communication. Vrasidas and McIsaac (1999) view ‘interaction’ from a technology perspective, as something that occurs between the users of computer mediated communication and which places an emphasis on the technology and how it can encourage interaction. Kearsley’s (1995) description of ‘interaction’ places the emphasis not on the individuals or the technology, but on the pedagogic implications and the instructional strategy within the learning activity. Both of these views are relevant to this research, and the affordance of computer mediated communication technology has been mentioned above, as has the need to integrate communication activities into the course activities.

However, to view ‘interaction’ in either technological or pedagogic terms would be to ignore the on-line social aspect of using the technology to communicate whilst engaged in learning activities. Austin *et al.* (2003) conducted a study of the ‘Dissolving Boundaries’ programme that uses technology to link schools between the north and south of Ireland, which interpreted interactivity as a social, collaborative activity created by student participation. Austin *et al.*’s study shows the relevance of this technology in being able to create a sense of social gathering within the discussion forums, where students are able to interact, experience and appreciate the views of their peers and work collaboratively with the other participants. This on-line social gathering is an important component in the students’ ‘interaction’, and facilitates a social constructivist platform that enhances their on-line experience and learning. Students’ acquisition of new knowledge is dependent on

the amount of constructivist activities in which they are engaged (Zhu, 1998). Zhu's research showed that 'interaction' was an important activity for the students to engage in as he noted how students who actively participated in computer mediated communication motivated, influenced and facilitated discussions, whilst the less active students merely assimilated information.

The view of 'interaction' that is being adopted in this research, whilst recognising the arguments of the technologists, is biased towards the learning and education view, due entirely to the environment that this study is being conducted in, with its emphasis on education and the importance in engaging with pedagogic elements of the students' course. Drawing on the work of Vrasidas and McIsaac (1999), Kearsley (1995), Austin *et al.* (2003) and Zhu (1998), and the context on which this research is based, interactivity is defined as a form of social exchange and knowledge construction, where students engage cooperatively with their peers and reflect on the views of others. Consequently, interactivity is measured by the specific nature and amount of student participation in the instructional computer mediated communication activities.

Reflective thinking

A key question that is being addressed by this research is can computer mediated communication support and encourage reflective thinking? This question prompts a series of further questions such as: what exactly does the term reflective thinking mean? Why is reflective thinking important? How can reflective thinking be measured? Should reflective thinking be assessed within the course? How can reflective thinking be encouraged? This section aims to answer these questions and explores the link between computer mediated communication and reflective thinking.

The notion of teacher reflection is not a new development. For example, Dewey (1938) recognised that reflection was a means for learning, and described that being reflective meant to rethink experiences, especially those that have been problematic, in an effort to make a clearer sense of them and learn and be better prepared for future experiences.

Dewey defines reflection as

that which involves active, persistent, and careful consideration of any belief or practice in light of the reasons that support it and the further consequences to which it leads. (Zeichner and Liston, 1996: 9.)

Reflective practice is something that improves with time, because it not only involves simple logical thinking processes but also personal experiences, feelings and intuitions. Effective reflective action involves attitudes of open-mindedness and responsibility that requires participants to examine multiple perspectives of their own and those of others (Dewey, 1938).

The procedure for reflective teaching, as advocated by Dewey, can be explained by viewing the work of classroom teachers, in simple terms, as a process where they plan, make provision and act. A reflective teacher will in addition, monitor, observe and collect data on their own and their pupils' actions and performance. This data is then critically analysed and evaluated, which leads towards decisions and actions being taken to revise classroom policies, plans and provisions, before beginning the process again.

Figure 2.4 is a pictorial representation of this cycle, showing a dynamic process that is intended to spiral towards higher quality standards of teaching.

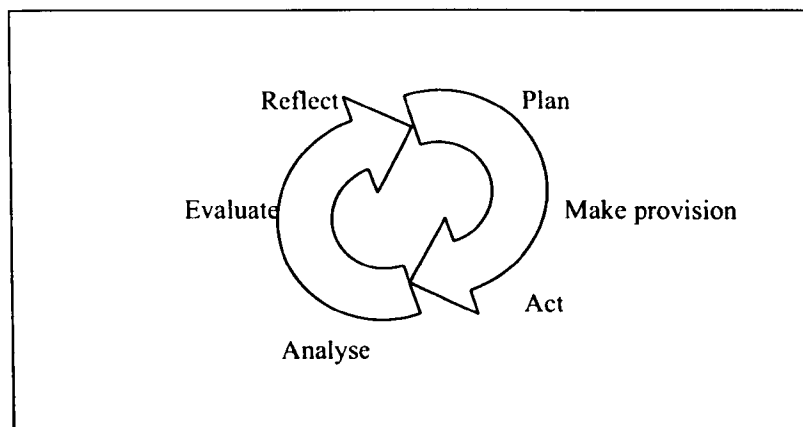


Figure 2.4. Dewey's process of reflective teaching, (Dewey, 1938).

Central to the discussion on the processes that are used in reflective teaching are Schön's (1982) framework of reflection-on-action and reflection-in-action. Schön (1982) described reflection as a professional activity, where teachers draw upon and adapt their knowledge to meet the specific situations they are faced with, and argued that reflection is a continual process that requires framing and re-framing of problems to address, evaluate and solve problems. He describes how reflective practitioners examine their work both at the moment it occurs and in retrospect in order to examine the causes and reasons underlying their actions and so generate improved and alternative actions / solutions in the future. The suggestions that many educators have taken from the work of Schön is that by reflecting-on-action, for example when a teacher reflects on something that happened in class after the class has finished, it leads to a greater capacity on their part to be reflective-in-action, which takes place during the action, and so adopting reflective classroom teaching that involves better decision making where classroom practice draws on the considered experience of the teacher.

The research carried out by Dewey and Schön focuses on an individual and almost personal mode of reflection; however, group reflection can also be particularly effective

and beneficial. For example, Feldman (1997) described the role of reflection in developing new knowledge and understanding as a distinctly social and collaborative one. He describes that when a dialogue between a group of teachers starts, one of the teachers talks and the others listen. As the others listen they try to relate what is being said to their own contexts, and so reflection occurs often resulting in responses being given such as questions, related anecdotes or opinions. This would suggest that reflection is very appropriate within frameworks of professional socialisation that encourage teachers to talk to each other. This is explored further in the following sections that consider the use of reflection within computer mediated communication and within professional socialisation networks.

Tutors on the PGDE course at NUI Maynooth have often described how effective group reflection can be, and how they frequently use this form of reflection during their tutorials with student teachers. Individual students have frequently commented how they use and refer to the shared knowledge of the tutorial group as reference points as they reflect on their own progress in school. Vygotsky (1978) and Kolb (1984) have both commented on the effectiveness of this type of approach, which has been found to be both educationally effective and personally rewarding for the students.

Reflective thinking and computer mediated communication

Computer mediated communication systems potentially allow users to converse with more than one person at a time and facilitate participant interaction on multiple conversational topics (Hawkes and Romiszowski, 2001). These multiple topics are organized through the 'threading' of conversations, where the conversational exchanges are grouped or linked together. The screen display in figure 2.5 shows an example of a threaded conversation; when a message is posted in reply to an earlier one it is placed underneath it and indented.

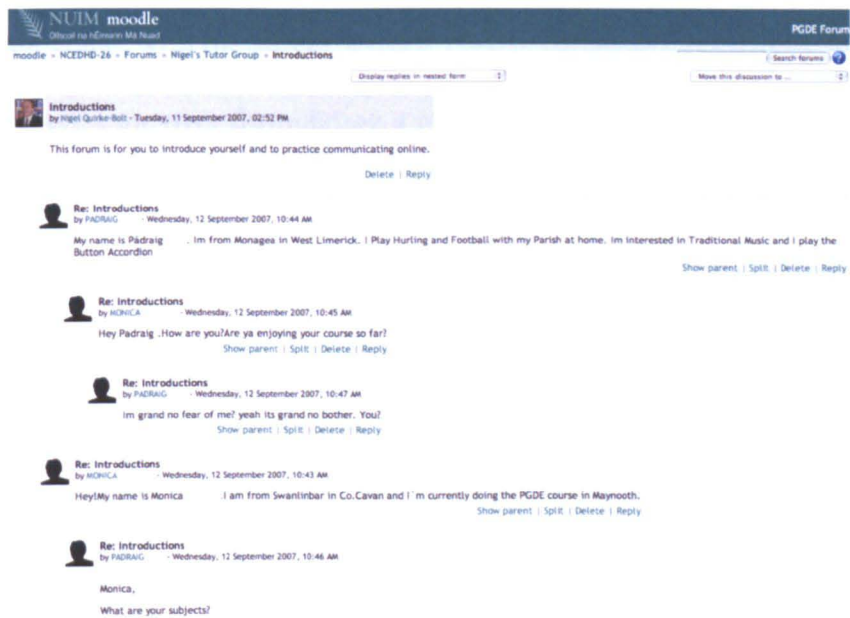


Figure 2.5 Example of a threaded conversation in an introductory tutorial discussion forum at NUI Maynooth.

There are several characteristics of computer mediated communication that suggest this medium has the potential to encourage reflective thinking. For example, the archive capabilities associated with these systems provides scaffolding that can help support reflective thinking, by allowing the users to retrieve, access and revisit earlier exchanges and conversations, to better inform and more precisely phrase and reference earlier ideas and dialogue with a view to challenging and sharply focusing current conversations. For example, Davie and Wells (1991) identified the usefulness of having a permanent record of communication that encourages students to return to earlier postings to rethink or revisit something to attain a deeper understanding and to stimulate further communication.

There are other features of computer mediated communication systems that can help to encourage reflection. The record that is contained within on-line discussion forums showing each message, with the author's name clearly displayed, invariably motivates the student to take more time over formulating a response to a forum message. For example, Graziadei (1996) found that students made more thoughtful responses in on-line discussion forums than in face-to-face tutorials. This was because the sense of an audience in the on-line forums increased the students' motivation to express original ideas, rather than in a face-to-face tutorial where they were found to be more inclined to echo the ideas of the more vocal members of the group, or of the tutor. Newman *et al.* (1997) came to similar conclusions. They compared critical thinking in undergraduate seminars that used both face-to-face and computer conferences and found that the depth of critical thinking was significantly higher in the computer conferencing system.

Many researchers have described how computer mediated conferencing encourages reflective thinking. The archiving facility, coupled with use of threaded discussion conversations, encourages users to read earlier messages before they reply and send in a new message, which promotes informed and reflective conversations. Burge (1994) found that students thought they experienced more reflective thoughts when using computer mediated communication than they would in a traditional classroom or lecture hall. The students described how the asynchronous format gave them greater time to think before they responded, and the written text entry encouraged them to think more carefully when expressing their ideas. Some of these students also described how they felt more connected and in tune with their peers' thinking. However, Burge's results raise the question about how we should measure reflection. The students' thoughts describing their reflective practices are interesting, but leads to questions such as have they really engaged in reflection, how might we gather this evidence and how might this reflection be measured?

In order to answer a key question that is being addressed by this research, can computer mediated communication support and encourage reflective thinking, it is necessary to be able to measure the reflection that takes place. El Dib (2007) argues that the question is not whether a student is capable of reflection, but at what level of reflection a person is operating. This suggests that the reflection carried out by students can be stratified over a continuum with a possible infinite number of positions in between. To determine how reflection might be measured the literature was re-examined to see how reflection was defined and so determine possible categories and levels that could be used in assessment.

Van Manen (1995) categorised the reflection that classroom teachers engage in into three levels. At the lowest level the teacher is only concerned with applying knowledge in order to reach pre-determined educational objectives, where the end objectives are not questioned. At the next level the teacher questions and clarifies the end objectives and the assumptions behind the teaching activities that are used to achieve these objectives. The highest level requires that the teacher is not only concerned with the goals, the activities and the assumptions behind them, but considers the wider context of education, and also incorporates moral and ethical questions. This categorization is useful to consider as it shows a progression of higher order thinking skills and how they might be used to evaluate reflection, and this categorisation was very influential in the later work of other researchers (El Dib, 2007).

Critical reflection is an approach advocated by Brookfield (1995), he defines critical thinking as characterised by two features:

The first is to understand how power undergird, frame and distort educational processes and interactions. The second is to question assumptions and practices that seem to make our teaching lives easier but actually work against our own best long-term interests. (Brookfield, 1995: 8.)

In essence, Brookfield's 'critical reflection' approach advocates that teachers should investigate and question their assumptions and search for multiple perspectives.

Brookfield's work provides a useful framework for understanding the dynamics of reflection and the constituent parts necessary to become an effective classroom reflective practitioner, but does not provide a clear identification of specific levels that are necessary to assess reflection.

The identification of specific reflective levels is moved forward by Ross (1989) who categorised reflection into three developmental levels. He classified a low level of reflection when a student teacher gives an example, describes practices or agrees with the opinions of others. A middle level of reflection is defined as shown when a student teacher can demonstrate a good critique of practice from one perspective and analyse in more detail teaching practices, and recognise that instruction must vary to meet different demands and needs of different situations and students. The highest level is shown when a student teacher views things from different perspectives and recognises that the impact of teachers' actions go beyond classroom settings. Ross's categories could be used in this research, but the various levels would need to be redefined to make them applicable to on-line discussion forums particularly as Ross's (1989) levels are intended to categorise the students' developmental stage in their ability to reflect.

Seven separate categories to assess the level of reflection that took place in a student teachers handwritten journal were suggested by Galvez-Martin *et al.* (1998) ranging from

zero where the student doesn't mention pedagogical concepts or skills, to seven where the student evaluates events from multiple perspectives. In this approach the student teachers were formally taught how to engage in reflective practices and Galvez-Martin *et al.*'s (1998) levels of reflection were chosen to categorise the effects on the student teachers of this teaching. The levels of reflection they used focused on viewing experiences from multiple perspectives, on a seven-point scale, moving from reflections on self, to reflections from a singular perspective, to reflections from a multiple perspective (teacher, student, parents, community). Galvez-Martin *et al.*'s work is interesting because it shows that it is possible to improve the student teachers' level of reflection through specific training. However, it is not applicable to this research, because the levels of reflection are closely linked with instructive components, and would require a programme of instruction on reflective practices that target Galvez-Martin *et al.*'s levels, and would involve changes to the PGDE course that are beyond the scope of my jurisdiction.

The approaches that have been described above provide a useful discussion in evaluating the identification and measurement of reflection, although they were not designed to be used within the context of computer mediated communication. Two appropriate methods of analysing on-line communication that were found in the literature were: Garrison's *et al.* (2001) 'Practical Inquiry' model and Gunawardena's *et al.* (1997) 'Interaction Analysis' model.

Garrison *et al.* (2001) devised a 'Practical Inquiry' (PI) model that suggests critical and reflective thinking involve a progression through four separate categories:

- A triggering event;
- Exploration;
- Integration;

- Generating a solution or resolution.

This model is based on Dewey's (1938) view of education as being the collaborative reconstruction of experience, where a community of inquiry provides a rich collaborative and reflective environment for higher order learning and which is necessary for knowledge construction. This model assumes a student collaborates with others to socially construct knowledge and it tries to measure reflective thinking as a process and an outcome of on-line communities, describing that participants apply reflection and action to facts and ideas.

In applying this as a method of analysis each message in a forum is categorised into one of the above four categories. Some other studies that have used this method (Marra *et al.*, 2004; Meyer, 2003) showed that the majority of messages were classified into the trigger and exploration stages. This highlights a problem in applying this approach to this project, as the exploration stage is too broad a term of reference and could result in messages being placed into this category simply because they are not considered to be 'integrating' or 'triggering'. The next model adopts a more holistic approach to this problem.

The model developed by Gunawardena *et al.* (1997) used an 'Interaction Analysis' (IA) approach, and was based upon an active view of knowledge creation, where knowledge is created through a process of interaction and critical reflection.

This model categorised on-line messages into one of five stages, which are listed here:

- Sharing / comparing information;
- Discovery and exploration of dissonance or inconsistency among ideas, concepts or statements;
- Negotiation of meaning and / or construction of knowledge;

- Testing and modification of proposal synthesis or construction;
- Phrasing of agreement, statements and applications of newly constructed meaning.

The list starts with the recall, sharing and comparing of information, and moves through similar levels to those classified by Bloom (1956) in his taxonomy of educational objectives, the comprehension, application, analysis, synthesis and evaluation of data as the students engage in the process of reflection and the communication of their developing ideas. This model interprets interaction as a constructivist and student focussed activity. The use of such interaction analysis of electronic transcripts remains one of the few methods available for studying the social and cognitive aspects of computer mediated communication (Fahy, 2005).

Interestingly, Kanuka and Anderson (1998) used the Gunawardena *et al.* (1997) model to examine the transcripts from computer mediated communication by educators involved in “distance education professions” and found that 93% of messages fell into the ‘sharing and comparing information’ category. This would appear to suggest that the reflective thinking that participants engage in whilst using computer mediated communication is not something that is particularly evident from the communication that participants engage in. It also suggests that this model is flawed in its approach to classify reflection, as the majority of messages are placed in one category. Although it is not suggesting that participants do not engage in reflective practices it is suggesting that applying this source of data to this model does not reveal the extent of reflective practices. Consequently, the data from the computer mediated communication forums needs to be used in conjunction with other sources, such as the focus groups, semi-formal interviews and questionnaires.

The 'Practical Inquiry' model and the 'Interaction Analysis' model have many other similarities. For example, the knowledge construction of the 'Interaction Analysis' has similar phases to the cognitive presence of the 'Practical Inquiry', although in comparison the 'Interaction Analysis' identifies more specific types of cognitive activity, such as argument, resource and evidence of changes and provides a more holistic view of the on-line discussions and the creation of knowledge (Marra *et al.*, 2004). The 'Interaction Analysis' also addresses the broadness of categories, mentioned above, in the 'Practical Inquiry' model and so is more practical for analysing electronic forum discourse (Li-Fen and Ifeng, 2007), as it includes codes for sharing observation, corroborating examples and showing agreements.

Although the approaches mentioned above approach the issue of classification from different perspectives they all share a number of similar characteristics and suggest that a synthesis of the approaches described might provide a workable measurement of reflection. A number of characteristics of such a system have been identified. Firstly, reflection exists at more than one level (El Dib, 2007). Secondly, reflection at a low level involves technical, habitual, subjective and rigid thoughts (Ross, 1989; Van Manen, 1995). Thirdly, the more a student's reflective thinking develops the more they appreciate the subjectivity of knowledge, the relativity of truth and the importance of context in determining meaning (Brookfield, 1995). Fourthly, the highest level of reflection involves questioning personal beliefs and assumptions, and the impact of external influences, such as societal and cultural values, over educational practices, and the consideration of moral and ethical arguments (Dewey, 1938; El Dib, 2007).

Summary

Within teacher education courses considerable emphasis is placed on developing the student teachers' reflective capabilities. This is because reflection is widely recognised as being an integral part of the learning process and is an important aspect in engaging higher order thinking skills and developing professional teacher practice. In spite of this reality there is no common definition of reflection, although the work of Schön (1982) and Brookfield (1995) have both been very influential in shaping a description of reflection.

The question that was asked at the beginning of this section, can computer mediated communication support and encourage reflection, was answered by the findings from this research study, where it has been shown that this form of technology does support reflective learning. However, the literature suggests that reflective learning does not happen on its own. Scaffolding and mentoring on the part of the tutors are also required in order to develop the student teachers' reflective abilities. The activities that are designed by the tutors are the key to encouraging reflection (Laurillard, 1994), and this suggests that the question that perhaps should be asked is at what levels of reflection does this technology best serve, and this is addressed in Chapter Five.

The literature review that has been carried out has revealed the constituent parts of an assessment of reflection, and a number of models have been considered for use in this study. The model that appears to be the most appropriate is Gunawardena *et al.*'s (1997), due to the holistic characteristics of its classification, but concern has been expressed in the high number of messages that fall within the one category. Consequently, if this model is to be used in this project the data from the computer mediated communication forums needs to be used in conjunction with the other sources of data, such as the focus groups, semi-formal interviews and questionnaires to determine a more accurate picture. A

possible solution might be to design and develop a more appropriate model for the purposes of this research study that identifies a workable approach to measure the student teachers' reflection within computer mediated communication.

Professional Socialisation

A significant emphasis of the PGDE course is the preparation of the student teachers for work in post-primary schools. The PGDE course helps the students to develop their own individual roles and identities within the school organisation and to absorb the values, attitudes, beliefs, language and specialized knowledge of the teaching profession, something that is often referred to as professional socialisation (Weedman, 1999).

However, although considerable research has been carried out on initial teacher education, usually focusing on problems directly related to classroom teaching, much less research has been carried out within the area of teacher professional socialisation, and the topic of student teachers joining a professional body and becoming members of a school's staffroom and various teacher organisations. The students' passage into these organisations constitutes a journey they are required to make if they are to join the ranks of teachers and become professional members of the teaching community. Research into teacher socialisation has been addressed by some (Bullough *et al.*, 1992; Lacey, 1977; Sikes *et al.*, 1985; Zeichner and Gore, 1990), but has focused largely on the impact of teacher training in preparing student teachers for the demands of professional life as teachers.

Teacher socialisation is viewed by Kuzmic (1993) and Rust (1994) as something that student teachers do not fall passively into, but that it is an interactive and interpretative process between the student teachers and their future professional context. I find this

notion appealing because it suggests that the student teachers are not only influenced by the context in which they find themselves, but that they also have an effect on the social structure they join, and describes a profession that is continuously evolving and developing according to the personal characteristics, energy and direction of its members. This idea is also appealing because it suggests that student teachers interact within a dynamic social setting that through professional socialisation is constantly improving and developing their professional practice and is also responding in a dynamic way to new challenges that confront them.

Coupled with this appeal is the notion that the professional socialisation of teachers has become increasingly important particularly in the realm of continuing professional development (CPD), and is something that student teachers should experience at the outset if they are to benefit from it during their early years as a new teacher. For example, a study conducted by the Department for Education and Skills (DfES) in the UK revealed that more than 90% of teachers believe their primary source of training, professional advice and support comes from their colleagues. New teachers have a particular need for both support and training during their early years as teachers and consequently they have a particular need to join and actively participate in these 'professional socialisation' groups in order to access training that they might not find so readily elsewhere.

Professional socialisation is very much influenced by peer groups (Bragg, 1976; Wentworth, 1980). As a result of exchanging experiences the student teachers help to formulate their own individual teaching styles and approaches. Because the amount of time that student teachers have to engage in this socialisation is constrained by the demands of the course, there is a need to provide the students with opportunities to develop as teachers. This research is attempting to examine the extent to which computer mediated communication can support the professional socialisation of the students.

Summary

It is widely accepted that we are living in a time of considerable educational change (Austin and Anderson, 2008; Rushby and Seabrook, 2008). These changes are not only affecting the topics educators teach, but also how they teach them. The recent developments in technology have contributed significantly to these changes by giving us access to vast amounts of information and allowing us to assemble, analyse and communicate this information in more detail and more quickly than before. Questions that arise from this are should educators incorporate and integrate these developments into their courses, and what are the effects of doing so on the participants, tutors and universities?

The literature shows that there is a considerable amount of use being made of computer mediated communication in many higher education courses. The excitement that this technology has generated, as evidenced by the considerable growth of virtual learning environments and communication platforms in higher education programmes, and the role and importance attached to critical reflective practices, suggests that this research project is both timely and relevant.

In essence, reflective thinking means rethinking experiences, particularly ones which are problematic, to better understand them and to gain insights for subsequent experiences (Dewey, 1933; Schön, 1982). It is common practice on teacher education programmes to encourage student teachers to engage in reflective practices to rethink and analyse their experiences both in their teaching practice schools and in their university subjects.

The literature suggests that if reflection is to occur in on-line discussion forums a number of elements need to be present, such as scaffolding for the student teachers, mentoring on the part of the tutors to develop the student teachers' reflective abilities, and activities that

are designed by the tutors to encourage reflection. The question that needs to be addressed is not so much whether on-line discussion forums encourage reflection, but what levels of reflection does this technology best serve?

The literature revealed a limited number of research studies that have measured reflection, and concern has been expressed at the appropriateness of using these studies within the context of computer mediated communication on this research. The model to measure reflection that appears to be the most appropriate is Gunawardena *et al.*'s (1997), due to the holistic characteristics of its classification, although as discussed in Chapter Five a need arose to design and develop a more appropriate set of categories for the purposes of this research.

The student teachers' professional socialisation is an important process that the students need to engage with, if they wish to become professional members of the teaching profession. They need to actively participate in communication with experienced teachers, and receive support, training and professional advice through this professional socialisation.

Chapter 3 Research Methodology

Although computer mediated communication is a relatively recent development, the body of literature in this area has grown rapidly. Unfortunately, the approach many researchers have taken has been anecdotal rather than empirical (Romiszowski and Mason, 2004).

Although there has been some empirical research, for example, Hrastinski and Keller (2007) examined the research approaches that were used in four well-known educational technology journals between 2000 and 2004 and found that a pluralistic research tradition has emerged, and that the characteristic of computer mediated communication research has been its openness to various research approaches.

The theme of being ‘open’ to various methods is also explored by Patton (1990), who advocated a “methodological appropriateness” when selecting a research methodology, and argued that a “situational responsiveness” drawing upon both quantitative and qualitative methods can provide insights that neither can provide when used on their own. I have tried to objectively assess and select the most appropriate research methodology and methods, and be ‘open’ to the possibilities that each presents in addressing the central research questions of this research project. As a result of this assessment a case study approach was chosen and this chapter describes why this forms the methodological framework for this project. In essence, this approach was used in an effort to capture the holistic account of the real life experiences of the participating students, to utilise a variety of research methods and to offer insight and expand the readers’ perceptions (Merriam, 1985) in their construction of knowledge (Stake, 1994).

On completion of the investigation into the research methodology an ‘initial study’ was carried out to test, practise and evaluate the chosen research methodology. The initial

study was a practical examination of the various chosen research methods on a test group of student teachers; this work and the resulting observations and conclusions are described in Chapter 4, The Initial Study.

Introduction

The students on the PGDE programme in NUI Maynooth that took part in this research were placed in schools for two days a week (Monday and Friday) as part of their ‘teaching practice’, the other three days of the week were spent in the university. During their three days in the university the student teachers attended lectures, workshops, tutorials and subject methodology seminars. The students on the PGDE course were placed into a tutorial group of between 12 to 18 students, each group was assigned an experienced classroom tutor and tutorials were held each alternate week throughout the year. The tutorials provided a forum for the students to raise problems and discuss concerns and issues arising from the course. The tutors offered a flexible programme of support covering various pastoral topics, which they introduced as and when they felt they were appropriate, and covered such areas as: time management, teacher stress, classroom experiences, and getting a job.

Students on the PGDE course had access to a separate area in Maynooth’s VLE that was reserved for them and which was password protected. Forums were set up within this area to allow the PGDE students to communicate securely with each other at any time and from any computer, on or off campus, with an Internet connection. This meant that these forums were not available to the general public or other students within the college. The students could initiate discussions, leave messages and reply and contribute to on-line conversations. The communication that took place within these forums was frequently

conducted over a period of time, asynchronously; students did not have to be logged in at the same time, messages were left in the forums to be read, and replied to, by others later.

The overall focus of this research was to investigate the effectiveness and use of these computer mediated conferences as a medium for communication and learning for the student teachers. How then should this study collect the data required to investigate this effectiveness?

Philosophical Perspectives

To begin the description of my research methodology I felt it was important to first consider and identify some underlying assumptions about what exactly constitutes ‘valid’ research and which research methods were the most appropriate for this study. I felt that an important philosophical assumption to consider was the underlying epistemology, the assumptions about knowledge and how it can be obtained.

Initially, educational research adopted scientific methods, which focussed on the testing of claims against empirical evidence and the provision of a detailed account of the methods used that showed how the findings had been obtained. The scientific method relies predominantly on numbers and statistics and refers to a ‘postivist’ paradigm that attempts to provide scientific knowledge by testing hypothesis against empirical data (Cohen *et al.*, 2000). This method assumed that there was an objective reality that needed to be uncovered, that science provides us with the clearest possible ideal of knowledge and that researchers should look for observable facts and apply methods of the natural sciences to the social sciences.

However, although scientific research methods have been successfully used in the scientific world they have not been as successful within educational contexts. Criticism has been directed at the contribution of scientific educational research to educational practice (Cresswell, 1998; Glesne and Peshkin, 1992; Lichtman, 2006), mainly because human behaviour has been seen to be much more complex than phenomena found in the natural world, and this has led to changes in opinion regarding the appropriateness of this methodology. Consequently, a new paradigm began to emerge, post-positivism (Lichtman 2006). This paradigm also strove for objectivity, but recognised the fallibility of researched knowledge and suggested that reality could be approximated, in that some research findings could be judged to be more 'true' than others.

The issue of objectivity in educational research has been the subject of frequent debate (Eisner, 1993; Phillips, 1993). Eisner (1993) questions the whole notion of objectivity, and suggests that it could be misleading to present findings as objective and suggest they might represent the 'truth', as they only represent a version of reality from a particular context. Phillips (1993) on the other hand describes the importance of objectivity in research, because it leads to a critical rigour and attempts to ensure that research

'has been opened up to scrutiny, to vigorous examination, to challenge... teased out, analysed, criticised, debated... it is a view that has been forced to face the demands of reason and of evidence.' (Phillips, 1993: 66.)

I have not felt entirely comfortable with either of these views and the position that I have adopted on this research study probably places me somewhere in between the two. I can appreciate that research findings can be both subjective and objective, in that there is a need for both a constructed interpretation and an impartial and critical rigour on the part of the researcher. The interpretation of objectivity that I have applied to this research project

is perhaps more at the subjectivity end of the scale, as it is one that leans more to being open and willing to listen to the voice of the students participating in this study, by using a variety of research methods, describing their views and experiences in a transparent way that incorporated the full range of perspectives that have been revealed.

This view of objectivity presents a problem as it does not fit comfortably within either of the two research paradigms of postivism and post-positivism mentioned above.

Consequently, I needed to broaden my investigation and consider other paradigms that existed in educational research. Guba and Lincoln (1994) suggest that there are four underlying paradigms: postivism, post-positivism, critical theory, and constructivism.

Denzin and Lincoln (1994) refer to post-positivism, post modernism and post-structuralism. Orlikowski and Baroudi (1991) suggest three categories: positivist, interpretive and critical. The variety of paradigms highlights the considerable debate that exists within the philosophy of research.

However, a paradigm that appears to offer a closer fit to my interpretation on objectivity for this research is 'interpretivism'. Interpretive research focuses on a subjective understanding of the human experience and attempts to discover the intentions and interactions of individuals with one another, or in the setting of this research, the student teachers' use of computer mediated conferences as a medium for communication and learning. This paradigm does not aim to test or prove theoretical concepts, as the theory emerges from particular situations (Cohen *et al.*, 2000), and is 'grounded' on data generated from the research (Glaser and Strauss, 1967).

Grounded theory is a research method that seeks to develop theory that is grounded in data systematically gathered and analysed. Martin and Turner (1986) described grounded theory as

“an inductive, theory discovery methodology that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations and data.”

(Martin and Turner, 1986: 141.)

The significant difference between grounded theory and other methods is its specific approach to theory development and is described in greater detail in the next section.

Research Methods

Whereas positivism utilises mainly quantitative methods, interpretivism lends itself more to a qualitative approach. Quantitative research uses experimental methods and quantitative measures to test specific questions and seek causal determination and prediction. A quantitative approach was used, for example in this study, to yield data on the ability and experience levels of the students in using computer forums and in determining student satisfaction ratings in using computer mediated communication. This type of data, while providing useful statistical information and providing a starting point from which further questions were identified, did not fully address the project’s research questions that focussed on the effectiveness of computer conferences to encourage reflective thinking and professional socialisation. This view is supported in the work of Cronbach (1975) who describes how quantitative methods are not suitable for determining the many interaction effects that take place in social settings, because they can ignore small effects that are not statistically important but are none the less crucial to understanding the interaction.

Qualitative analysis provides a different type of knowledge to a quantitative approach, potentially resulting in illumination and a deeper understanding of underlying causes and

events and was important in researching the nuances, causes and effects of computer mediated conferences and in determining what Denzin (1989) calls the 'thick' description.

Consequently, a case study approach was chosen for this research study, drawing on its characteristics of bringing together both quantitative and qualitative research methods (Hrastinski and Keller, 2007) and allowing particular questions to be addressed and analysed both subjectively and objectively, and also to utilise its potential in offering new insights into effective practice and the subsequent development of context based theory and the discovery of further research questions. The next section explores this approach in greater detail.

Case study

The concept of a case study is common within a range of research contexts and disciplines, and many areas such as anthropology, law, psychology and medicine have their own particular case study conventions and methods (Tellis, 1997). Although the focus, tools and practices may differ from one discipline to another, the overriding purpose of using a case study is invariably the same, it is used to provide an examination of an occurrence or sequence of events (Janesick, 1994; Silverman, 1993; Stake, 1994; Yin, 1989). Yin (1989) describes a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context. This suggests that a case study is a useful method to adopt when contextual conditions are important, which is particularly relevant when investigating the learning that takes place in e-learning environments (Laurillard, 1994).

A typical case study research project would use interviews and documentary materials, with the documentary materials in this project being the discussions from computer mediated conferences. Importantly, a case study approach can accommodate a variety of

underlying philosophical assumptions. For example, Yin (1989) advocates a positivist case study approach, while Walsham (1993) recommends an interpretive in-depth case study method. A positivist approach might use a case study to test hypothesis or quantifiably measure variables and assumes that social reality and humans are independent, whereas an interpretive approach would use a case study to qualitatively determine reality through social constructions such as conversations and shared meanings. This suggests that the difference between positivist and interpretive case studies is in the epistemological and ontological viewpoints taken by the researcher. The positivist viewpoint is that scientific knowledge consists of facts, and its ontological view is that reality is independent of social construction (Walsham, 1993), which contrasts with the socially constructed epistemology and ontology of the interpretive view. The research methodology used by this project attempted to adopt an interpretive approach, but also utilised the positivist approach to collecting data.

Social scientists use case studies as the basic feature of social science research. However, they do not appear to use a standardized approach and there is considerable variety in the approaches and methods used by researchers (Ragin and Becker, 1992). Case studies are invariably different from one research project to another; they do not easily follow a template, guidelines or a definitive set of rules. A particular characteristic of a case study is that there are few certainties and this can pose problems in using a case study as a method of research. However, this characteristic can also be viewed as a strength. Using a case study, existing assumptions can be questioned and re-evaluated, which helps the researcher to reach a greater level of understanding and can lead to the formation of new knowledge on topics that, perhaps, were not the original focus of the research.

Adopting a case study approach has a number of advantages and disadvantages. Case studies are sometimes criticized as being flawed because they involve ‘less rigorous’

methods than those used in positivistic, experimental and quantitative research methods (Denzin and Lincoln, 1994; Fontana and Frey, 1994; Guba and Lincoln, 1994; Yin, 1989). However, case studies also offer significant advantages. For example, Adelman *et al.* (1980) describe the advantages of a case study approach as its applicability to real-life, contemporary, human situations. A significant advantage in adopting a case study approach for this research project is the potential it offers to understand the students' experiences. For example, educationalists first started using case studies to understand and explain why changes in teaching practices were not improving academic test results. (Adelman *et al.*, 1980; Cresswell, 1998). The work produced by these case studies revealed the experiences of the participants and this led to an understanding of how people learned and the factors that supported this learning. Sturman (1999) describes how case studies provide a broader holistic view of a process or situation that includes the context as well as the details of the event. A particular strength of case studies is that they can cover both processes, from largely qualitative data, and outcomes from quantitative data (Tellis, 1997). For example on this project, data could be collected on the students' aims, actions, using quantitative methods, and their feelings and attitudes, using qualitative methods, which could help to provide a more complete understanding of the learning process they are engaged in. Merriam (1985) explains how case studies are useful for studying learning innovations, such as on-line learning, because they observe effects in real contexts and can use a variety of research methods that provide a rich description of an event, involving both processes and outcomes.

Adelman *et al.* (1980) and Cresswell (1998) describe a case study as a 'bounded system' that is often defined as a study of a single unit, a person, group of people, an event or group of events over a relatively short period of time – usually less than a year. Case studies have many similarities with ethnographic studies in that both employ qualitative empirical research methods. However, a case study is usually less complex than an ethnographic

study. MacNealy (1997) describes ethnographic studies as being much broader, with a wider focus, often involving whole communities, and usually lasting for a longer period of time. The distinguishing feature of ethnographic research is the amount of time spent by the researcher in the field; typically the researcher immerses themselves in the lives of the people they study, and the fieldwork notes and experience of living there becomes an important part of the data gathering techniques - a case study places considerably less emphasis on participant observation.

Case study methods are sometimes criticized because the study of a case does not always offer convincing evidence for establishing reliability or generalisability of findings (Yin, 1994). Case studies are often used to examine the particular and the unique, a concern of this project was that the findings from this case study might not provide generalisable and reliable results. However, this concern could be overcome when readers of the study relate aspects of it to their own contexts and experiences. The analysis and debate provided by the author of the case study helps the reader to reflect on and perhaps re-think their own knowledge and experience, allowing the reader to agree or disagree with the evidence presented by the case study. In this way a specific case study has the potential to inform the work of others in different circumstances. The case study should reveal the significant events of a situation, as opposed to the insignificant or frequent, where the quantity of information is replaced by the quality, and which allows the reader to gain an insight into the real dynamics of the situation.

Grounded theory

Glaser and Strauss (1967) described how the purpose of grounded theory was to develop an explanatory theory of basic social processes, studied within the environments in which they take place. Applying grounded theory to this research project involved a careful

observation of behaviour within the on-line forums and an examination of the dialogues that took place between the students and between the student and tutors with the aim of generating a descriptive and explanatory theory of the use of computer mediated communication by the students.

The three key elements of grounded theory are concepts, categories and propositions. The concepts are the basic units of analysis from which the theory is developed. A concept is an incident, event or happening that is a potential indicator of a phenomena. For example, as explained by Corbin and Strauss (1990):

If a respondent says to a researcher, "Each day I spread my activities over the morning, resting between shaving and bathing", then the researcher might label this phenomenon as 'pacing'. As the researcher encounters other incidents, and when after comparison to the first, they appear to resemble the same phenomena, then these too can be labelled as 'pacing'. Only by comparing incidents and naming like phenomena with the same term can the theorist accumulate the basic units for theory. (Corbin and Strauss, 1990: 7.)

The next element of grounded theory is the category, which is used to abstractly link and group concepts together. They are generated through the same analytical process of making comparisons to identify similarities and differences used to identify concepts. The categories are the key parts that are used to develop and provide the means of integrating the theory. Using the above example, this process is described by Corbin and Strauss (1990):

In addition to the concept of 'pacing', the analyst might generate the concepts of 'self-medicating', 'resting' and 'watching one's diet'. While coding, the analyst

might note that, although these concepts are different in form, they seem to represent activities directed towards a similar process: keeping an illness under control. They could be grouped under a more abstract heading, the category: 'Self Strategies for Controlling Illness'. (Corbin and Strauss, 1990: 7.)

The final element pulls the various categories together to formulate propositions that indicate generalised relationships between a category and its concepts and between discrete categories. Glaser and Straus (1967) originally called this element 'hypothesis', but the term propositions is more commonly used as this better describes the conceptual characteristic of the resulting relationships.

A grounded theory approach was chosen for a number of reasons. Firstly, because a grounded theory approach focuses on the "process of generating theory rather than a particular theoretical content" (Patton, 1990), it allows me to explore the theme of *how* on-line communication might encourage reflective thinking.

Secondly, being aware of potential researcher bias is an important consideration if the findings of this research are to be valid. Grounded theory encourages the researcher to recognise bias and examine the data sensitively in order to identify emerging categories and patterns (Strauss, 1987).

Thirdly, grounded theory is an approach that is well suited to building theory from social interactions (Glaser and Strauss, 1967), because, to use this project as an example, it requires that the codes used to analyse the data come from the language used by the students. This can be achieved by exploring exactly what the students mean when they use key words or phrases.

Lastly, grounded theory encourages the researcher to be open minded and flexible in responding to the data that is collected (Strauss, 1987). This is an important feature of this approach, as the data gathered from this project's focus groups discussions would not only help to modify and adapt the questions that were given to subsequent focus groups, but would also lead to modifications and improvements to the activities the students were asked to undertake as part of their course work involvement.

The grounded approach as described by Glaser and Strauss (1967) encourages the use of multiple data sources to converge on the same phenomenon and provide different views to understand a category and its properties, and refer to these views or vantage points as 'slices of data'. The next section explores the different data collection methods used to capture these 'slices of data'.

Data collection methods

A significant strength of the case study approach, and the 'appropriateness' (Patton, 1990) of this methodology in addressing the research questions of this project, was the combination of different data collection methods that could be used.

Adopting a variety of data collection methods facilitates a process of triangulation (Feagin *et al.*, 1991) to validate and cross check findings (Patton, 1990). 'Triangulation' is the process of cross checking information by comparing data from different sources that provide a comment on the same topic or theme. For example, this project gathered data from semi formal interviews (Appendix D), text entries in computer mediated communication forums and from quantitative questionnaires (Appendix A and B). The data from these three sources were compared to see if they support each other. Stake (1995) describes triangulation as the protocols that are used to ensure accuracy and

alternative explanations and is useful for increasing the validity of the results. The use of a number of sources of data can also help to sharpen observations and clarify meanings (Denzin and Lincoln, 1994), which can be used to strengthen analysis and verify emerging conclusions (Miles and Huberman, 1984).

Questionnaires

Questionnaires can be used to provide an efficient method of collecting quantitative data (Peterson, 2000). Jones (1990) and Bouverie *et al.* (1994) identify a number of advantages as well as disadvantages in using questionnaires. They describe the advantages to include being easy to design and administer, providing quick results and feedback and giving a good indicator of participants' feelings. However, problems are described in the hurried speed at which participants often complete forms and with answers often being influenced by subtle nuances in the questions. Further problems can arise in the timing of the questionnaire with the results being sensitive to the mood of the participants (Peterson, 2000), or perhaps more pertinently in this project, to the stage of their experience and development.

On-line questionnaires are a recent development and are included as an optional feature on most VLEs, including the one used in this study. On-line questionnaires present the added advantage of being easily distributed, in that the student accesses the appropriate web page. The completed questionnaires are collected by accessing the tutors' area on the web site, where they can be viewed on the computer screen or downloaded onto a computer for viewing later. The questionnaire results from the VLE used by this study are displayed in a spreadsheet, showing individual responses and group statistical results. The questionnaire facility on the VLE reduces the administration necessary to process the

results and allows the responses to be viewed rapidly in a digital format and avoids possible input transcription errors.

The ethical issues that are raised by questionnaires (discussed in more detail below) require careful consideration. Questionnaires are an intrusion into the life of the students, they take time to complete, are often an invasion of privacy and can ask questions that the students might find threatening or sensitive (Cohen *et al.*, 2000). For instance, a student might be asked to disclose personal information that they are reluctant to divulge to the college; for example, questions that might be seen as determining their suitability to a teaching career.

The purpose of using a questionnaire in this study was to gather data on the aspects of this case study that were quantifiable, for example data on the students' levels of computer literacy and levels of competency. This data was collected during the main research study from an anonymous on-line questionnaire that all of the 160 students completed during their induction training into virtual learning environments at the start of the course (Appendix A) and during an exit questionnaire at the end of the year (Appendix B). Both of these questionnaires included dichotomous questions, multiple choice questions and open-ended questions. The dichotomous and multiple choice questions were used to determine the level(s) of the students' knowledge, experience and attitude towards using technology in general and computer mediated communication specifically. The open ended questions were used to gather information on the opinions and feelings of the students about working in a virtual environment and to identify issues and concerns that were investigated further during the focus groups and semi-formal interviews.

The literature identifies a growth in the number of studies that use text documents from computer mediated communication forums as a prime source of qualitative information in educational research (May, 1993; Silverman, 1993). As noted by Murray and Sixsmith (2002) the nature of this form of communication allows a variety of qualitative data analyses to occur, such as, discourse analysis, grounded theory and interpretive phenomenological analysis, and the conversations that take place in the computer mediated forums are particularly important in addressing the main research questions of this project (for further discussion on these methods refer to the *Analysis of data* section below).

The forums provide a record of the conversations between participants that are easily accessible and readily available for textual analysis. The forums used in the main research study were the tutorial forums that each of the 160 student teachers had access to and which were not moderated and all messages posted were left intact and unaltered. The students' communications are available, both immediately and long after they were made, and can be seen in context, as a part of a threaded conversation, allowing the researcher to understand the cause and effect of each part of the developing conversation. The researcher is able to monitor and analyse the evolving communications in an invisible way without the knowledge of those being studied and so reducing the danger of possibly influencing and distorting the communication (Paccagnella, 1997). However, this also raises ethical issues, and these are discussed in detail later in this chapter. The development of the conversation, and more importantly the level of reflectivity displayed by the students, can be discerned using the analytical tools mentioned in the next section.

The Moodle system ensures the authenticity of the communicators, as students must first log on to the system with a valid username and secure password before they can post to the

forums. It should be noted that if students are aware of other students' login details they could leave unauthentic messages, but this would, hopefully, be quickly detected when the 'real' student logged in and saw messages that they had purportedly written.

The credibility and authenticity of data gathered from the computer mediated communication forums is a particular concern of this study. Lincoln and Guba (1988) and Denzin and Lincoln (2000) describe the need for researchers using qualitative methods to be as aware as 'positivist' researchers would of the validity and reliability of their data. Adopting a grounded theory approach helped to include a certain rigour and the iterative process of analysis that this approach promotes, the constantly reflective examination of the data does, as Hammersley (1993) describes, provide a safeguard for qualitative researchers.

Using computer mediated conferences as a source of data raised particular concerns because it has been reported in the literature how students on occasions portray an image of themselves that was slightly different to the one they presented in face-to-face sessions. Palloff and Pratt (2001) describes how on-line learners often adopt new personas in on-line communication and Rheingold (1994) argues that this medium allows people to be seen as they would want to be seen - as thoughtful transmitters of ideas and feelings. However, the construction of an 'on-line' identity is inextricably linked with our own beliefs and values and is 'integral and continuous' (Kendall, 1999), and as such is difficult to sustain if it is different from the real self. The medium of computer mediated communication does not undermine the authenticity of the students' voice, but may actually enhance it through encouraging the students to reflect and consider carefully their statements and the message that they communicate.

Kreuger (1988) defines the activity of a focus group as a ‘carefully planned discussion designed to obtain perceptions in a defined area of interest in a permissive non-threatening environment’. Using a group to address and focus on key questions allows the students to discuss their ideas, thoughts and perceptions and presents opportunities for the participants to modify, and refine their responses in the light of comments from others or alternatively to express themselves with a degree of certainty and support from the group. Vaughan *et al.* (1996) say that ‘the major assumption of focus groups is that with a permissive atmosphere that fosters a range of opinions, a more complete and revealing understanding of the issues will be obtained’. It is this ‘more complete and revealing understanding’ that makes this particular research tool an important element of the data gathering process.

The greater anonymity of the group environment provides support for the individual students and helps to reduce the pressure they might otherwise feel in an individual interview. The students invariably feel more relaxed and confident with the less formal structure of a focus group interview, where they are encouraged to share their thoughts rather than provide specific answers to a series of questions (Kreuger, 1998). The focus group interview ideally provides an environment where the students can freely express themselves and also discover new meanings and understandings from the interchanges with their peers (Vaughan *et al.*, 1996).

This research method was included during the latter stages of the project to gather perceptions of the students’ experience and outcomes of the project, and because of its potential to encourage from the participating students a range of views and reflections about their experience of computer mediated conferences. During the main research study eight focus group interviews (Appendix C) were carried out using the busiest and least

active tutorial groups. The advantages and appropriateness of using this method on this research project were identified as: provides an effective way of collecting the opinions of the group; the group provides an authentication check on the views expressed and helps to balance the outspoken views of certain members; they offer the opportunity of listening to the views of a greater number of participants than single interviews.

The significant disadvantages of focus group discussions are that only a limited number of questions can be asked during an hour, particularly if the views of the entire group are to be listened to and group discussions evolve from the participants' responses. Identifying a smaller number of key questions and structuring the session carefully to elicit specific answers from the group can overcome this problem. However, this requires experience and skill on the part of the facilitator in conducting an efficient and effective focus group interview. Further problems can also arise if the group experiences conflict, such as disagreements and power struggles. Selecting the members of the group carefully and determining whether the participants are willing to partake in such an activity helped to avoid this. It was also found to be prudent to ask if anyone would prefer to be interviewed on their own.

Digital tape recorders were used to capture the students' comments from both of the focus group interviews. As suggested by Howe and Lewis (1993) students identified themselves at the beginning of the interview, to test the recording equipment and to facilitate the transcription of the tape afterwards.

Interviews

An individual one-to-one interview can help to gather opinions, attitudes, personal aims and insights that might otherwise be difficult to discern from other research methods

(Kerlinger, 1970). However, the use of the interview is made more appropriate when it is used in conjunction with other research tools. For example, interviews have particular advantages over questionnaires in that they can provide a richer and more complete answer from the student (Cannell and Kahn, 1968), and provide an opportunity for the revelations and insights that have emerged from the questionnaires and focus group interviews to be 'teased out' and explored in greater detail, and it was for this reason four interviews with student teachers were conducted during the main research study. The interviewer is able to discern the attitude and feelings of the person being interviewed more accurately as a result of the personal contact that is established with the interviewee. Secondary questions can be asked that relate to the replies of initial questions, which can provide a deeper understanding of the students' actions (Barker and Johnson, 1998).

The interview when used in conjunction with other methods allows the researcher to triangulate the gathered data and use it as a check to verify and assess the data's accuracy. Using an interview to triangulate and integrate with data gathered from quantitative and qualitative methods revealed whether this data is converging, complementing or contradicting the data from other sources and allows the interviewer to explore emerging inconsistencies and anomalies. The interviewer is able to check the honesty and accuracy of the answers and adjust and re-focus the interview questions accordingly.

The interview style can range from an informal conversation at one extreme to a formal survey at the other. An informal interview is useful when the interviewer doesn't want to constrict the interviewee with a list of topics that might interfere with the flow of information (Glesne and Peshkin, 1992). The interviewer will have one or more topics that they wish to cover, but the questions and the order in which they are asked are flexible. This allows the interviewer to respond to the answers they receive and give greater or lesser emphasis to different topics depending on the information that is received. This

approach was used in the main research study to understand and appreciate the tutors' perspective, and three tutors were interviewed by selecting questions from a list of question prompts (Appendix D).

At the other extreme formal survey interviews have more in common with questionnaires. The order, wording and choice of questions remain the same each time the same questionnaire is used.

A common disadvantage of interviews is the possibility of interviewer bias, where the interviewer influences the students' answers. Tape recording an interviewee can help to reduce this (Patton, 1990), but in turn this can lead to further problems by inhibiting the respondents' answers, perhaps making them feel inhibited and more wary of answering certain questions (Lincoln and Guba, 1985).

Another disadvantage of the interview is the threat to validity. Interviewees can give answers that are inaccurate because they may remember facts and incidents inaccurately or respond through the filter of hindsight. Interviewers often ask for physical facts during their initial questions on a topic, in an effort to help the respondent recall things more accurately. The wording and order of questions needs to be carefully considered. A common mistake is to ask leading questions that prompt a certain type of answer, such as 'What kind of problems did you encounter?', which assumes that problems were experienced. The order of questions can also influence the answers; a particular answer given by a respondent can bring a certain thought sharply into focus that then influences subsequent answers.

A third disadvantage is the time that is necessary for the researcher to conduct a series of interviews. Problems arise at the end of a busy academic year in scheduling and arranging

for all the participants to attend the interviews. Following on from the interview, the transcribing of tape recordings is particularly time consuming and expensive.

It is acknowledged that the research interviewers' skills are valuable in gaining accurate data from the respondent, and my lack of experience in conducting interviews presents a further disadvantage. These disadvantages were subsequently addressed in the 'Initial Study' and the resulting solutions and work-arounds are described in Chapter 4.

Computer Logs

The Moodle VLE software has a feature that allows an administrator to view all the interactions that take place when the on-line areas are accessed (Dougiamas and Taylor, 2000). This provides an enormous quantity of data that can be used to provide statistics on the frequency and use of the system (Martinez *et al.* 2003). The computer logs show the amount of time the participants spend in the various areas within the VLE and the activities in which they became engaged; this includes information on the forums they visit and whether or not they contribute by posting comments or replies. It is possible to recreate the sequence of activities by using the 'History' feature, which works in a similar way to the History feature found in most Web browsers, but which contains additional information such as a duration, time and date stamp.

In addition to showing quantitatively how participants use the computer mediated communication forums, the forums also provide useful data for triangulation purposes, which were compared with the students' responses in the questionnaires and focus group and semi-formal interviews.

Computer logs provide useful data on the students' activity, or inactivity, and use of the various computer mediated communication forums. The students were required to log-on to the VLE and their access and usage of the system was recorded and this data was readily available in a variety of formats.

Analysis of data

Eisenhardt (1989) describes the analysis of data as often the least developed part of case studies and potentially the most difficult. Dubé and Paré (2001) support this view and state that only 5% of 168 case articles they reviewed mentioned the use of a process of analysis. Tellis (1997) describes how some researchers have suggested that if the case study produced data that allowed statistical analysis the process of analysis would be easier.

Eisenhardt's difficulty arises because of the data that is collected from case studies, which is often so rich in detail that it is hard to interpret and difficult to analyse (MacNealy, 1997). Patton (1990) describes how qualitative researchers use inductive analysis of data, where critical themes emerge out of examining the data.

This section explores how the data collected from the data collection methods described above were analysed on this project.

Focus groups and semi-structured interviews

The purpose of using focus groups and semi-structured interviews in this research is to gather data that addresses the two central questions of this study: can computer mediated communication support and encourage reflective thinking; to what extent might this use of technology encourage professional socialisation.

Yin (1994), Silverman (1993) and Stake (1994) all advocate that case study researchers should first look for patterns and / or categories in the data, and identify the themes that emerge from the ‘raw’ data. The patterns and categories that Yin (1994), Silverman (1993) and Stake (1994) mention will be identified using the analytic methods of interpretative phenomenology, discourse analysis (Gee, 2005) and grounded theory (Glaser and Strauss, 1967), and it is hoped that by drawing upon these three approaches to examine the same data a rich and broader understanding of the students’ communications will emerge. For instance, interpretative phenomenology (Appendix E) focuses on how the students make meaning of their experience, discourse analysis (Appendix F) examines how language is used to accomplish tasks and grounded theory (Appendix G) develops theories of the social processes involved within computer mediated conferences. A summary of how these analytical approaches address the two central themes of the project are given in the table below.

| Area | Phenomenology | Discourse Analysis | Grounded Theory |
|----------------------------|--|---|---|
| Reflective Learning | To understand the students’ experience from their engagement in on-line communication. | To understand the reasons for the students’ reflective learning from on-line communication. | To identify the components of successful reflective on-line communication. |
| Professional Socialisation | To understand the students social experience of on-line communication. | To understand the causes and motivating factors of professional socialisation. | To identify the factors that encourage professional socialisation amongst the students. |

Table 3.1 Overview of analytic methods in addressing key research areas

The methods used to interpret and analyse the data within these approaches are similar. Interpretative analysis is an iterative process that involves decontextualisation and recontextualisation (Ayres *et al.*, 2003). Decontextualisation involves separating the data from the original context and assigning codes to the units of meaning in the text communications. Recontextualisation involves an examination of the codes and patterns and reintegrating, organising and focusing on central themes and relationships drawn across the gathered communications.

These three interpretative methods distil the textual data to a set of categories, sometimes referred to as ‘axial coding’ (Straus and Corbin, 1990). This involved linking and comparing the emerging themes in an effort to assemble the bigger picture. The purpose of this stage was not only to describe, but also to acquire new understanding of a phenomenon of interest (Hoepfl, 1997). The causal events that have contributed to the phenomenon needed to be identified and explored. As the researcher builds a conceptual model additional data was collected, as it was needed, to support and investigate it further.

The final stage involved the translation of the conceptual model into a narrative that others will read. Strauss and Corbin (1990) describe how the research report should be a rich and tightly woven account that “closely approximates the reality that it represents”.

Using a step-by-step method it was possible to identify a process of analysis and adopt a mechanism that provided a rigorous and systematic approach. The analysis of the data started while it was being collected and lead to decisions about what to add or change in subsequent data collection methods.

This case study obtained both quantitative and qualitative data. The qualitative data required a detailed analysis leading to comparisons where categories were established and the properties and relationships of these categories were identified; from this, explanations behaviours, actions and events were then determined (refer to Chapter 5).

Computer mediated conferences

Whereas the focus group and semi-structured interviews were used to determine the causes, reasons and factors of the students' interactions in computer mediated communication, the data that was gathered from the computer mediated conferences focused on the evidence of the type of communication that occurred. For example: questioning and challenging (Simon and Bernstein, 1985); constructivist dialogue (Jonassen, 1998); collaborations of various forms (Bullen, 1998; Rose, 2004); approaches to group mediated thinking (Gunawardena *et al.*, 1997). Consequently, the data gathered from the computer mediated conferences required a different method of analysis to the data gathered from the focus groups and semi-formal interviews.

The most appropriate method of analysing on-line communication that was found in the literature was Gunawardena's *et al.* (1997) 'Interaction Analysis' model, as described in Chapter Two.

The model developed by Gunawardena *et al.* (1997) used an 'Interaction Analysis' (IA) approach, and was based upon an active view of knowledge creation, where knowledge is created through a process of interaction and critical reflection.

This model categorised on-line messages into one of five stages, which are listed here:

- Sharing / comparing information;
- Discovery and exploration of dissonance or inconsistency among ideas, concepts or statements;
- Negotiation of meaning and / or construction of knowledge;
- Testing and modification of proposal synthesis or construction;
- Phrasing of agreement, statements and applications of newly constructed meaning.

As discussed in Chapter Two this model might not be entirely appropriate, as in previous studies of this type a large proportion of on-line messages have fallen within the one category, although in using this model an initial classification of messages can still be made from which it might be necessary to formulate a modified set of categories, using a grounded theory approach.

Questionnaire and Computer Logs

Measuring and counting data from the questionnaires and computer logs provided quantitative data. This data was used to yield statistical summaries and provided information that helped to answer specific research questions and triangulate findings from the qualitative research methods.

The questionnaires were used to collect data on the following: the students' initial level of computer experience; the students' level of computer competency; the students' attitudes towards using computers in general and computer mediated conferencing in particular.

Ethical considerations

Ethical considerations were embedded into the research process used in this project and were an important consideration whilst working on this project. I have been very much aware of my responsibility as an educational researcher to ensure that this research project was carried out within a rigorous framework that was ethical and that allowed the participants to have trust in its outcomes. I have tried to be vigilant not only in ensuring the validity and reliability of this research, but also to respect the dignity of the various participants in the quest for truth and knowledge.

Sikes (2006) argues that it is important for researchers to be clear about why they want to research a particular topic, what use the findings will be and to consider the ethical issues that could arise. In this project I found the relationship I had with the participating students as an area that gave rise to such issues. For instance the data that was gathered provided information of a highly personal nature to the participants and required a considerable sensitivity and integrity in my role as researcher.

I have been acutely aware of my role and responsibility as a researcher, which has involved considering the ethical concepts of trust, dignity, privacy, confidentiality and anonymity. These concepts have been adopted by the Ethics Committee at NUI Maynooth and are described in their 'Ethical Review & Research Integrity General Policy Statement', and I have found these guidelines a useful source of reference for this research project. Similar principles have also been adopted by the British Educational Research Association (BERA, 2004), the American Educational Research Association (AERA) and the European Educational Research Association (EERA), which includes 20 European national associations including the Educational Studies Association of Ireland (ESAI). These organisations have adopted principles to ensure that the research undertaken is carried out

within an 'ethic of respect' that adopts a code of conduct, which provides consistent expectations regarding the action of researchers, as well as protecting individual participants.

I have found it helpful to undertake this research project within the explicit and publicly recognised codes of ethical conduct mentioned above. However, these codes were primarily written for educational establishments with on-site teachers and students, and not for on-line applications where the participants are distant from each other and the researcher. Cohen *et al.* (2000) explain that ethical guidelines should not be definitive but should be applied in context, and I have tried to apply them within the context of virtual learning environments, although as Cohen *et al.* (2000) point out this can lead to problems in deciding how far to apply the context and the personal judgment of the researcher. Ess (2004) described how researchers of on-line communication faced a range of ethical issues arising from working in the environment of virtual spaces. For example researchers can face additional problems in protecting the participants' privacy and anonymity and ensuring authenticity in on-line forums, including such issues as ownership of shared on-line conversations and identities.

A key ethical consideration in this research project was obtaining informed consent from the students and tutors that participated. All participants were required to give their consent to participate in this research. This involved describing to the participants the nature and scope of this project and giving them a choice of whether they wished to 'participate in the research and that they know they had the right to withdraw from the research at any time' (Greig and Taylor, 1999). The participants' right to privacy was also explained and that their identity would be protected, with the published conversations of participants being given an alias.

An important data source on this project were the on-line conversations of the participants from the various forums, where each conversation contained the full names of the authors and links to their email addresses and historical record of previous messages that had been posted. In addressing fears about protecting the participants' privacy all participating students and tutors were informed all names would be removed, with aliases used to indicate only the person's gender, from the posted messages that were displayed in this research project. However, some students raised concerns about protecting their privacy and anonymity on-line as they would sometimes be revealing personal and particular information from which they felt it might be possible to recognise and identify either themselves or their school. Consequently, in addition to receiving signed permission from the participants to use their on-line and focus group conversations the students whose messages are displayed in these pages were contacted for their permission to display their messages in the figures shown in this thesis.

In using the ethical framework approach described above I have tried to show a respect for the students, staff and university that were all involved in this project. From the outset of this project I have tried to adopt an ethically professional approach in assisting the research process and have tried to uphold the academic standards of the Open University and NUI Maynooth. The ethical guidelines from NUI Maynooth have provided a contextual and conceptual background in which to engage in critical thought when answering the research questions of this project. This critical thought process has stimulated a reflective practice and has enhanced the professionalism in which this research has been carried out.

Summary

A particular concern in conducting research with the group of students outlined above is the 'insider research' issue (Aquilar, 1981) and the problems this can raise. Familiarity

with the students, college and the intended learning outcomes could result in bias and a form of blindness, where results are used to reinforce prejudices and pre-conceived views, although using a grounded theory approach could reduce these problems, the assumptions that are made by the researcher could significantly influence the research. The author has an Information and Communication Technology (ICT) background, having worked as an ICT teacher over a period of twenty years and having completed a variety of graduate and postgraduate courses within this field. Significantly, many of these courses were studied with the Open University within a distance education paradigm; this experience has been a very formative one and I feel I have benefited considerably from the use of technology in education. The potential for bias is mentioned here to alert the reader that my interpretation and analysis of findings could be coloured by my experiences, and also to consider some of the problems in conducting research.

Another concern is the ‘theoretical sensitivity’ of the researcher (Strauss and Corbin, 1990). This refers to the researcher’s personal qualities and the awareness of the subtleties of the potential meaning of the data collected and refers to

the attribute of having insight, the ability to give meaning to data, the capacity to understand, and capability to separate the pertinent from that which isn’t.

(Strauss and Corbin, 1990: 43.)

Eisner and Peshkin (1990) also describe the importance of the qualitative researcher’s credibility and the importance of the researcher’s readiness to attempt a qualitative research project and the skill required to detect the subtleties and meanings of data and the capacity to identify, understand and analyse pertinent data are particularly relevant.

Strauss and Corbin (1990) describe how theoretical sensitivity is developed from experience in a number of key areas, including the professional literature, and professional

and personal experiences. As a researcher I have a concern regarding my own limited experience in examining qualitative data in a meaningful and holistic fashion and then also in communicating my interpretation to others.

This research project uses both quantitative and qualitative research methods within a case study approach. The decision to use a variety of research methods was chosen partly to broaden my own experience and expertise in conducting a research project, as well as to collect a rich source of data that could be used to address the project's research questions.

I find it daunting to consider how the researcher carries the burden of discovering and interpreting the importance of what is observed, but feel satisfied that the chosen research methods will provide the data from which the project's research question can be answered. The next chapter investigates this concern in greater detail through the practical application of an initial research study and explores the appropriateness of these research methods in addressing the research questions of this project.

Introduction

One of the main purposes of the ‘initial study’ was to conduct a small-scale investigation to evaluate both the research methods, described in the previous chapter, and the usefulness of the collected data. The focus was placed on assessing the suitability of the chosen research methods and to consider how the data produced addressed the central research questions of the project.

Another purpose of the initial study was to provide an opportunity to develop my own research skills and to draw upon the expertise of colleagues working in the Education Department at NUI Maynooth. Working in Maynooth brought me into contact with researchers who had considerable research experience, and I was keen to use this research project as a valuable learning opportunity and utilise the knowledge within the Education Department.

An important area of investigation, which was considered during the initial study, was to establish the links that existed between the theoretical framework and the research methods and to develop my understanding of the issues central to the project’s research questions.

This chapter describes the work carried out in the initial study, outlining the research methods used and identifying the problems and limitations of these methods. A summary of the lessons learned is described, and the chapter is concluded with an account of the implications for the main research study.

Test group

The initial study was carried out, during the course of one academic year, on my tutorial group of thirteen students, who were all studying the PGDE one-year course at NUI Maynooth. This group consisted of seven male and six female students, all with Irish nationality and with ages ranging from 24 to 53 years.

Using my tutorial group as the test group in the initial study presented a number of advantages; for example, I had regular timetabled access to them during the year and was able to introduce the various research methods as part of their tutorial work. I also felt that having a tutor-student relationship with the group made it possible to understand a broader picture, outside of this initial study, of their concerns and requirements on the course, something that an external researcher might have had difficulty in discerning, although using this group of students also presented problems, such as those associated with ‘insider research’. For example, knowing and being familiar with the students, possibly, resulted in various assumptions and pre-conceived judgements of the data from the on-line interactions and the focus group discussions. I was particularly conscious of this when I was reading the messages they posted in the forums, as it was possible to cross-reference their on-line messages with statements and opinions they had expressed in face-to face tutorials and during informal conversations during the day. In addition, the students responded to me as their ‘tutor’ and were aware of my involvement in this research and this would have affected their behaviour and the level of their participation. For example, being their tutor on the PGDE course I was involved as an internal assessor of their teaching practice in school and was the person that provided a reference when they applied for teaching posts at the end of the course.

The test group were introduced to the aims and purposes of the initial study at the start of the academic year and were asked if they wished to participate in this project - they all agreed to be involved. The test group were aware that they were part of an experiment and that the work they were engaged in did not form part of their assessment on the PGDE, and was consequently viewed by the students as something extra - an 'add-on' to their course. During the initial study it was noticed how the student teachers prioritised their time on the course and focussed specifically on the parts that were assessed. I believe the student teachers would have been much more active contributors in the on-line forums if they'd had this additional motivation and their contributions had formed, for example, an 'assessment for learning' component of the course, where assessment is an integral part of the learning process (Black *et al.*, 2003).

During the year when this initial study was carried out the entire cohort of PGDE students were introduced to Moodle, NUI Maynooth's virtual learning environment platform, through their Educational Technology lectures. The focus of these lectures was to show the students how Moodle could be used to support their progress on the course, with the emphasis being placed on accessing resources, such as lecture notes and handouts, and accessing communications from the course team. These lectures were held in the main Education Lecture Hall at the start of the course in October, this was to introduce Moodle in a formal way to the student teachers and to help them appreciate that Moodle was an integral part of the PGDE course. However, the lecture format was generally found to be unsatisfactory by many of the students in the Test Group; largely because, although they found it easy to follow the information the lecturer delivered, when they attempted to do the same thing afterwards many of them encountered problems.

The test group found they needed additional technical information to that given by their Educational Technology lecturer, which was specific to communicating on-line with each

other and this was provided by myself, as and when it was needed. In addition to the information and help they requested, members of the Test Group were also given advice on effective on-line communication, and 'netiquette'. This involved, for example, how to develop an on-line dialogue through the use of short focussed postings that encourage a response, and that when replying to another student teacher's contribution they should provide them with supportive and encouraging references to their earlier postings.

Initially, eight separate forums were created in the VLE for the test group to access as part of the initial study, which had the following titles: The School Forum, The Examination Forum, Lesson Plan Ideas, Resources, Special Educational Needs Support, Lecture Topic Discussions, Mature Students Forum, and The Tutorial Forum. The test group were given un-restricted access to all of these forums, allowing them to read, write and upload content without restriction.

The Tutorial Forum was designed to be used by the tutor as a place to introduce and discuss a number of broad topics that related to the course, which included examinations, public perception of teachers, discipline, disadvantaged groups and teacher pay. The tutor introduced the topics in the tutorial session, describing central questions and issues that surrounded each topic, and then encouraged the students to think about the issues the topic involved and post their comments to the Tutorial Forum. The students were able to read each other's comments and could enter into a dialogue with the other students, explore their understanding of the topics and develop their thoughts on the issues that arose.

Data collection methods

A key aim of the initial study was to test and gain experience in using specific research methods, with only a selection of research methods described in the research methodology

chapter being used in the initial study. The methods that were chosen were questionnaires, focus group interviews and collection of the data obtained from the VLE's forums. These methods were selected because I felt a need to develop my practice and understanding in using them prior to conducting the main research study.

Questionnaires

An initial and an exit questionnaire were used in the initial study to evaluate this research method, and also to experiment with on-line questionnaires and gauge the quality and usefulness of the data gathered. The initial questionnaire was given to the test group as part of an introduction to the use of the VLE; the students accessed it on-line and completed the questions on the computer. In addition to introducing the students to accessing and logging on to the VLE, the students were informed that the purpose of the questionnaire was to determine their capacity and readiness to use the VLE and to allow adjustments to be made to accommodate their needs and to provide additional support mechanisms, should they be needed.

This initial questionnaire (refer to Appendix B) was also used to gather data on the following:

- The students' initial level of computer experience;
- The students' level of computer competency;
- The students' attitudes towards using computers in general and computer mediated conferencing in particular.

The Moodle system has a built-in feature that allows a questionnaire to be administered on-line. This offered a number of advantages; firstly, the data that was entered in a digital

format was easily exported into a spreadsheet and subsequently displayed in a statistical format using tables and graphs, which helped to provide a rapid view of the students' responses (Kieley, 1996; Schmidt *et al.*, 1997). Secondly, the distribution and collection problems in using paper-based questionnaires were lessened and the students were able to complete and return the questionnaire easily. Thirdly, the on-line questionnaire provided the student teachers with a degree of confidentiality and anonymity (Hewson *et al.*, 1996; Smith and Leigh, 1997). The main disadvantage found in the literature to on-line questionnaires is that the researcher has little control over the conditions and environment in which the questionnaire is taken (Smith and Leigh, 1997); for example, the student teachers are not able to ask questions to clarify difficulties and misunderstandings, and the student teachers might take the questionnaire under distracting circumstances, such as in one of the busy and noisy Internet cafés on the university's campus. In recognition of this, the test group was taken to a computer room and asked to complete the entry questionnaire in a supervised setting. At a tutorial near the end of the course, prior to the terminal examinations, the students were again taken to a computer room and asked to complete the exit questionnaire.

As all the students were able to complete the on-line questionnaire within the NUI Maynooth virtual learning environment, a certain level of computer competency amongst the test group of student teachers was shown. The entry questionnaire provided statistical information on the student teachers' computer experience and their initial attitudes to using computers in general and computer mediated communication in particular. The results from the entry questionnaire showed that the students were computer literate. For example, 100% of respondents had used a computer to produce coursework assignments and 62% had visited websites to facilitate their learning. However, this questionnaire also revealed that a significant number of the students had limited access to a computer with only 38% of student teachers owning their own computer and also that only 23% had used

virtual learning environments prior to their joining the PGDE course. The data shown in table 4.1 shows how the student teachers were favourably disposed to participating in the project, and also revealed a general level of apprehension coupled with a belief that working with computer mediated communication could provide them with a worthwhile experience.

| | Disagree strongly | Disagree | Agree | Agree Strongly | Don't Know | Response Total |
|--|----------------------|----------|--------|-------------------|---------------|-------------------|
| I think it will be useful addition to tutorial work. | 8%(1) | 0 | 54%(7) | 31%(4) | 8%(1) | 13 |
| I would not like people outside the tutorial group to read it. | 0 | 31%(4) | 38%(5) | 23%(3) | 8%(1) | 13 |
| I am concerned about the technical aspects of using forums. | 0 | 31%(4) | 46%(6) | 23%(3) | 0 | 13 |
| Working in groups like this could help to develop my thinking on various topics. | 0 | 31%(4) | 46%(6) | 15%(2) | 8%(1) | 13 |
| I will feel comfortable in making written comments. | 0 | 15%(2) | 46%(6) | 31%(4) | 8%(1) | 13 |
| I am interested in the potential of new technology. | 0 | 15%(2) | 62%(8) | 15%(2) | 8%(1) | 13 |
| I would prefer to use face-to-face meetings for this work. | 0 | 31%(4) | 38%(5) | 23%(3) | 8%(1) | 13 |
| I feel comfortable with discussing topics on-line. | 0 | 38%(5) | 23%(3) | 15%(2) | 23%(3) | 13 |

Table 4.1 Example of student teachers’ responses in ‘Entry Questionnaire’

The entry questionnaire contained solely closed questions. This was because the purpose of the entry questionnaire was to determine the student teachers’ level of computer competency, technical experience and attitude towards computer mediated communication. The closed questions facilitated a quick analysis and provided useful statistical data, although these questions limited the responses the students could give, which might have resulted in the students choosing an answer that did not entirely cover their preferred response. For example, one question asks *Did you find it easy to post messages into the Moodle forums?* The students were provided with a yes / no option, which could have

been expanded to include a number of options, perhaps using a likert scale, ranging from *very difficult* to *very easy*.

The data obtained from the entry questionnaire provided feedback on the student teachers' attitudes, level of computer experience and technical competency and helped to identify training needs and the level of support that the student teachers required to successfully participate in the initial study.

An exit questionnaire was also given to the test group on-line, using Moodle, and was used to gather the opinions and attitudes of the students on their completion of the course. The data gathered was compared with the data from the initial questionnaire, to detect changes in opinions and attitudes, and also studied to identify central issues and areas of concern for the students that could be further explored during focus group discussions and semi-formal interviews.

Whereas the entry questionnaire consisted of closed questions, the exit questionnaire consisted of mostly open questions, in an attempt to reveal the feelings and opinions of the student teachers towards communicating in on-line forums. The open-ended questions took longer to analyse but presented interesting and unexpected data, and gave a deeper insight into the experience of the students. For instance, there was strong evidence of the time pressure the students experienced during the course and how some of the students had struggled to cope with this. The results and evidence from the questionnaire raised a number of questions and these were presented to the students during the focus groups interviews, such as why they felt apprehensive about using computer mediated communication and how they thought it might benefit their work on the course; refer to the section below for further details.

The exit questionnaire revealed a number of points that the participants liked about communicating in on-line forums, for example:

Checking to see if anyone had commented on your messages;

Encouraged you to say whatever you liked;

Encouraged a different type of teamwork;

Using the technology was a huge learning curve;

Getting to know people in a different way.

(Student teachers' responses in exit questionnaire)

The responses highlighted the variety of factors that the student teachers liked about communicating in on-line forums. I found it interesting to note that none of the participants mentioned that communicating in on-line forums had helped them to increase their understanding of the topics under discussion, or that it had helped them to reflect either to a greater or lesser extent than if they had communicated in a face-to-face discussion. Instead, they focussed on the use of technology and the new experience it offered. This was due in part to the wording of the questions, which were subsequently modified to address this point in the main study, but it also revealed for me the value of being able to carry out semi-formal or focus group interviews in conjunction with and to support and triangulate the data obtained from the questionnaire. Interviews have a significant advantage over questionnaires as a research tool in that they allow the researcher to respond to the participants' answers, and to question, probe and explore the participants' responses more deeply.

The data from the questionnaires was useful in that it helped to frame the questions that were asked in the semi-formal interviews and focus group discussions. For example, a question in the questionnaire asked if the students had experienced difficulties using the

on-line discussions forums, and the students selected to tick the box that described the level of difficulty they had experienced; the focus group question asked the students how did you overcome your difficulties. The results from both questionnaires provided data that was subsequently used to validate and cross-reference information from other data collection methods, described below.

Focus group interviews

As mentioned above the data gathered from both the entry and exit questionnaires conducted in the initial study provided useful information that helped to formulate the focus group interview questions (Tuckman, 1972). These included questions on the students' attitudes and experiences of their use of the electronic forums, and some examples are shown below.

Thinking back to the very beginning of the year when you were first introduced to the computer mediated communication project: what were your feelings about it?

How worthwhile was the project in helping you to think about the topics and issues that were raised? (Probe into the ease of communication and whether they encouraged reflection and the influence the project might have had on the students' developing thoughts.)

What were the problems you experienced whilst working on this project?
(Probe how the students overcome difficulties inherent in communicating in this way.)

Focus group questions, Appendix C.

The focus group interviews provided an opportunity to ask questions that were open-ended and unstructured and which encouraged the students to answer from a variety of dimensions and at a deeper level (Kreuger, 1988; Stewart and Shamdasani, 1990), examples of which are shown below.

Did the project help you think about ethical issues in working in teaching that you might not otherwise have thought of? (Probe into whether the students thought more deeply about the issues and whether they engaged in critical thinking.)

Has the project changed your view of learning with technology? Would you feel comfortable learning in this way, perhaps on a distance-learning course? (Probe into whether the students would be happy to use computer mediated communication to communicate with other teachers.)

How do you think the project could be improved? (Probe into the difficulties as well as the advantages of using this approach: was it easy or difficult to achieve the goals set out in the discussions.)

Focus group questions, Appendix C.

The focus group questions provided data that helped to answer, with a greater degree of clarity, the central research questions of this project. The focus group questions are shown in Appendix C.

Due to my lack of experience in conducting focus group interviews I was eager to learn how more experienced researchers conducted them. I organised ten focus group discussions during the year, three of which I carried out and the remaining seven were facilitated by different interviewers. Two of the interviewers were student teachers from

the PGDE course who were taken from a different tutor group to the one participating in the initial study; another was a lecturer of Educational Studies from the PGDE course; another was a PGDE tutor that was not known to the student teachers involved in this initial study; another was from a tutor from the postgraduate Counselling course, with considerable interviewing experience. I arranged to be present in the room as a non-participating observer while these focus group interviews were conducted, and hoped that I would learn from observing the different facilitators at work and that this experience would help me to improve and develop my own group interviewing skills. In addition to using different facilitators a number of other variables in the focus group discussions were adjusted, and these included the size of group, venue, timing and duration, and it was hoped this experimentation would lead to recommendations for the later focus group interviews carried out in the main research study.

Using a student as a facilitator presented a number of advantages, the student facilitator had an understanding of the experience that the questions addressed and had a relationship with the focus group students that was noticeably more informal than the Education Department staff facilitators. When this approach was used two focus groups of six students, plus the student facilitators were set-up. The transcripts of these sessions show that the students being interviewed were more relaxed and less formal than when the facilitator was a tutor, and this can be seen in many of answers that were often very brief and jovial. Some typical responses to questions are shown below.

I thought some of the stuff was so serious, I mean, who really thinks like that?

Yeah, it was no problem.

I liked the way you can check the forums in the bar.

(Student teachers' responses from a student led focus group discussion)

It was almost as if the student teachers felt opposed to giving a serious answer in front of the student facilitator. For example, when a student was asked how they had ‘overcome difficulties when communicating in on-line forums’, the reply was ‘what difficulties?’ It was also noticed in these sessions that one or two more-vocal students tended to dominate proceedings, and that the student facilitator either did not notice how the interviews were being manipulated by one or two of the students or did not have the necessary group facilitation skills to address this. A particular area where a lack of skill on the part of the facilitators was noticed was in the way both failed to probe into the group’s responses at key moments during the interview, and the opportunity to gather data that addressed underlying issues was not always uncovered. An example of this is given in the transcript below. This student’s comment was made during a discussion on how the students felt about contributing in an on-line discussion.

There is a certain political correctness that you need to go along with.

(Student teacher’s responses from a tutor led focus group discussion)

From listening to this particular student at other times, I believe the student is referring to the influence of the tutor’s expectations in the on-line discussions. However, because the facilitator did not question the student on what was meant by ‘political correctness’ an opportunity that might have revealed the level of influence of the tutor in an on-line discussion was lost.

Using the tutor from the course as a facilitator presented one or two advantages, namely a familiarity with this research study and a good understanding of the student teachers. The data collected during these interviews was more serious and less jovial than the student facilitated interviews, and the responses from the students tended to be longer and more articulate. For example when the tutor asked the group if anyone had experienced

problems in communicating within the on-line forums one of the student teachers responded:

I noticed how easy it was for people to get the wrong end of the stick! I found that you needed to be very careful when you send a message into Moodle, because your message could be interpreted differently to how you intended.

(Student teacher response from a tutor led focus group discussion)

The above response is very different to the 'Yeah, no problems' comment from the student led focus group, and highlights how influential the facilitator can be.

The tutor from the counselling course was unfamiliar with both the students and this project, but this person had considerable experience in interviewing and facilitating focus group discussions. The counsellor made much better use of the time than the other facilitators, identifying when a point should be pursued and when to move on, when to encourage discussions between the students and when to focus on a single student. The data produced was noticeably less general and more insightful and precise than the interviews facilitated by the others. For example, after being probed a student teacher revealed:

I don't feel motivated to use these forums that much, because they are not assessed and so they are not as important as other things we are asked to do which are.

(Student teacher response from a tutor led focus group discussion)

This comment reveals a candour that the student might have been unwilling to disclose in the tutor or student led interviews, and/or which a less experienced interviewer might not have unearthed.

The number of students in each of the ten focus group interviews was varied, from using the full group of fourteen to smaller groups of between four and eight. The facilitators reported that focus group interviews of fourteen were difficult to manage, in allocating each person an equal amount of time to air their views. Quine and Cameron (1995) found that large groups of twelve or more often resulted in more than one person speaking at the same time, which made transcription afterwards difficult and resulted in lost data. Basch (1987) suggests that the most appropriate numbers are between six to twelve, and Krueger (1988) suggests groups of between six and eight. During the initial study it was found that all of the student teachers had an opinion on discussion forums, and that between six to eight students was a number that provided each student with enough opportunities to contribute towards the discussions, and was also easier for the interviewer to manage.

The length of the interviews was varied from twenty to fifty minutes. It was found that more time was needed with larger groups, particularly if the interviewer wanted to encourage each student to contribute to the discussion. With the questions that were used in the 'initial study' focus groups discussions (Appendix B), it was found that the optimum time duration to collect the students' responses, for a group of between six to eight students, was twenty to thirty minutes. This time span allowed each student in the group to contribute to the questions being asked and for a reasonable discussion to develop around the issues that the questions raised. In addition, it was found that the student teachers were happy to participate in discussions that only took thirty minutes of their time, particularly if they were told in advance that the discussions would not go over half an hour.

Digital tape recorders were used to capture the student teachers' comments from the focus group interviews. Using a digital format to record the interviews was found to be satisfactory and the resulting digital audio files were easily loaded and transferred onto a

computer, from where they could be edited and later transcribed. The quality of the digital recording was also found to be satisfactory and the software that was used to replay the recordings (Audacity – <http://audacity.sourceforge.net/>) allowed easy editing and adjustments to quality of the recordings. However, it was noticed that certain venues produced a background noise, or hum, due to noisy air-conditioning or noise from outside traffic, which made hearing the more softly-spoken students difficult and which was not always evident at the time of the interview.

Computer software that transcribed the data recordings from the tape recordings was trialled and found to help on the occasions when the recorded voice was clear, and did help to reduce the amount of time transcribing interviews by around 30%.

Computer forums

The computer forums contained the on-line textual conversations that the students had been engaged in during the course of the year. The Moodle system uses threaded forums that allow postings to be linked to particular messages. The students were able to read the various communications in the forums and then select the ones they wished to contribute to; they could also initiate and start new discussion by creating a new forum discussion. This resulted in multiple on-line ‘conversations’, with many of the students participating in more than one conversation.

During the initial study this research project used the Gunawardena *et al.* (1997) model, as described in the previous chapter, to determine the level of student teacher reflection in the on-line discussion forums. This model was chosen because it provides a more holistic view of the on-line discussions and the creation of knowledge (Marra *et al.*, 2004), and it is also more practical for analysing electronic forum discourse (Li-Fen and Ifeng, 2007).

Gunawardena *et al.*'s (1997) model suggests categorising on-line messages into one of five levels:

- Sharing / comparing information;
- Discovery and exploration of dissonance or inconsistency among ideas, concepts or statements;
- Negotiation of meaning and / or construction of knowledge;
- Testing and modification of proposal synthesis or construction;
- Phrasing of agreement, statements and applications of newly constructed meaning.

The initial study examined the 'Tutorial Forum' because this was the only forum used by the tutor and the students that actively encouraged reflective practices. For example, the tutor introduced the topics in the tutorial session and then encouraged the students to think about the issues the topic raised and post their comments to the Tutorial Forum.

The messages that the student teachers posted were categorised using Gunawardena *et al.*'s levels and this resulted in the classifications shown in table 4.2.

| | Sharing and comparing | Discovery & exploration | Negotiation & construction | Testing & Modifying | Application |
|------------|--------------------------|----------------------------|-------------------------------|------------------------|-------------|
| Messages | 254 | 93 | 62 | 55 | 11 |
| Percentage | 53% | 20% | 13% | 12% | 2% |

Table 4.2 Classification of messages posted in the Tutorial Forum

These results show how the student teachers' forum messages can be categorised to show the type of interaction that occurs. The reflective processes of interaction are more in evidence in the 'discovery and exploration', negotiation and construction', 'testing and modifying' and 'application', than in the 'sharing and comparing' category. Consequently, when referencing Gunawardena *et al.*'s levels, 47% of messages were found to be reflective, as shown in table 4.2, although the extent of the reflective practice is not evident from this data alone. This highlights the importance of integrating the data from this research method with data from other research methods, such as the focus groups discussions, semi-formal interviews and questionnaires, and this is explored in greater detail below.

Lessons learned from the initial study

This section outlines the main lessons learned from the initial study and is linked to the next section, which describes how these lessons learnt then shaped the main research study.

Introducing the students to Moodle through the Educational Technology lectures raised a number of concerns, primarily because this input lacked a practical element. Other concerns centred on the emphasis that was placed by the lecturer on accessing resources rather than the practical use of on-line communication, and also the timing of these lectures which began eight weeks after the start of the course. This form of introduction into on-line communication was found to be largely inadequate for most of the student teachers, and as the tutor of a group of PGDE students I found it necessary to provide extra instruction on effective electronic forum communication, and how to access VLE resources, such as the on-line questionnaire.

The use of on-line questionnaires in this study was found to be successful. For example, not one of the students expressed any concerns about completing the on-line questionnaire and for some it provided a useful introduction to the VLE. The on-line questionnaires required less administration time than the more traditional paper based questionnaires; for example, the on-line questionnaires didn't need to be photocopied, distributed, collected, sorted and analysed in the same way as the traditional paper questionnaires did. The on-line questionnaire software provided summary data of the students who had completed the questionnaire, showing when and how long it had taken them to complete it, which questions they omitted and displayed the results statistically in a spreadsheet format for analysis.

The qualitative data from the focus groups was time consuming to transcribe and analyse, but produced rich experiential feedback from the student teachers and presented a worthwhile opportunity to collect the diverse and spontaneous opinions and thoughts of the participants.

Experimenting with the ten focus group discussions led to a number of findings. Firstly, the student teachers were happy to communicate their thoughts and feelings in a focus group discussion, and they provided much more in-depth information on the specific topics being covered than the questionnaires, particularly as the interviewer was able to question and clarify the points the students made. Secondly, the synergy of group interaction stimulated the students' reflection on the issues raised, and provided an opportunity to collect data in a relatively short space of time that focussed on addressing the research questions and providing information on the students' experiences. Thirdly, the preferred time duration of the focus group interviews was between twenty to thirty minutes, and the optimum size of the group was between six to eight students. Fourthly, the skill and

experience of the interviewer that facilitates these group discussions is important, particularly when encouraging the participants to reveal and clarify information. Fifthly, using a digital recorder meant the audio files were easily loaded and transferred onto a computer, and then edited and transcribed.

In addition, organising the focus groups around the students' 'tutorial' group was considered to be important as it meant that the students were familiar with each other and were relatively comfortable in each other's company. They had built up a level of trust and experience in discussing various topics and issues as part of their tutorial sessions.

At the beginning of this project I was concerned about my lack of experience in working as a researcher. This was found to be less of a problem than I imagined, although my lack of experience in carrying out research was most evident in the facilitation of the focus group discussions. The literature reports that data obtained from focus group interviews is very often reliant on the skill of the facilitator (Kreuger, 1998, Vaughan *et al.*, 1996), a view that is supported by this initial study. However, I came to realise that despite my lack of experience in research methods I was the most suitable person to facilitate the focus group discussions, because of my knowledge in the subject area addressed by this research and my sharp focus on the research questions.

The initial study used Gunawardena *et al.*'s (1997) model, to determine the extent to which the student teachers used the forums to engage in reflective practices. Each student message was classified using the model's five levels, which revealed that 47% of messages were reflective. Applying Gunawardena *et al.*'s model to the initial study was straightforward, although to determine the full extent of the reflective practice in the main study this data was cross-referenced with data from the other research methods, described

in Chapter 3, such as the analytic methods of interpretative phenomenology, discourse analysis (Gee, 2005) and grounded theory (Glaser and Strauss, 1967).

The role of the tutor on this research project is also an area that needs to be considered, because the issue of ‘insider research’ is a major concern, on a number of different levels. During the ‘Initial Study’ in the focus group interview that I conducted, as the group’s tutor, I exerted an influence on the group as a whole that affected their behaviour and response to the questions and ensuing discussions, although it should be pointed out that the other facilitators also exerted an influence and also affected the behaviour of the student teachers. For example, should the tutor participate in the on-line discussions, or only initiate and then moderate them, to what extent should the tutor influence the on-line conversations? It was agreed with the PGDE tutors that it would be more beneficial for the students to develop their on-line communication skills amongst their peer group, and that the tutor’s role should be to moderate these forums and provide an input, such as clarification or guidance, only when necessary.

Implications

The purpose of the initial study was to carry out a small scale investigation to evaluate some of the research methods, described in Chapter 3, and to determine the usefulness of the collected data in addressing the central research questions of the project. This section concludes this chapter and describes the implications from the initial study on the main research study.

One research technique that was not used during the initial study, due to the limited number of participating students, but was used in main research study, was the expert panel or ‘nominal group technique’ (Kreuger, 1988). A nominal group is similar in size to a

focus group, consisting of students with particular knowledge or expertise in the issue under investigation. In this method the participants consider a question or a number of questions and list their thoughts individually on paper. They then share, review and discuss each other's responses, ranking each point in order from the most to the least important. Forming such a group harnessed the thoughts and opinions of students with valuable prior experience in using computer mediated communication. In the full cohort of students on the PGDE course there is each year a small group of students who have a significant level of computer experience in the area of on-line communication and this group proved to be a valuable source of information in the main study.

The initial study did not involve semi-formal interviews either, as it was felt that the available time for the initial study would be better allocated investigating the other research methods, and focus on improving my own research capability, such as developing my skills in the facilitation of focus group discussions, which were particularly limited at the outset of this research.

The overall research plan and timing of the various research methods used in the initial study followed a logical sequence and for this reason was also adopted in the main study. The initial questionnaire was delivered and integrated into the students' 'induction week' on the course, as the students were introduced to Maynooth's VLE and computer system. This presented a good opportunity to gauge their initial reactions to on-line communication and determine their attitudes towards this way of working. The exit questionnaire provided data to evaluate changes in attitudes between the start and end of the course and to determine the willingness of students to continue with this form of communication after the course as part of their professional socialisation.

During the initial study an equal amount of time was spent between developing the on-line questionnaires and experimenting with the focus groups. As a result of the development work carried out on the questionnaires during the initial study, less time was needed in this area during the main study, and so considerably more time was spent on the focus groups and individual interviews in the main study. The focus group interviews were conducted at the end of the first semester, after the students had been using the system for approximately three months, and at the end of the second semester. As well as gathering data, the first round of focus group discussions were timed to monitor the progress and perceptions of the students, and to identify any emerging problems and put into place remedial action. The second round of focus group discussions and individual interviews captured the students' thoughts and experience as they neared the end of their one-year course and were focussed specifically on the central core research questions.

As a result of carrying out the initial study the student teachers' introduction to the VLE was changed in the following year when the main research study was carried out. The changes that were introduced included an afternoon hands-on training session during the students' induction week, held at the start of the academic year in September. During this training the students were shown how to communicate in the forums and chat rooms, how to initiate discussions and how to contribute to existing on-line conversations. The students were made aware of appropriate communication techniques and were given time to practise these skills in a series of classroom-based exercises that focused on participating in on-line discussions. The aim of this training was to ensure that all the student teachers could competently use on-line discussion forums as a medium of communication from the start of the course.

As a result of carrying out the initial study it was felt that the chosen research methods were relevant approaches to use in addressing the research question that focussed on the

student teachers' reflective practices. The use of an expert group, or 'nominal group technique' (Kreuger, 1988) that utilised the students with experience of computer mediated conferences prior to the course revealed useful insights into approaches and techniques that could be used to encourage 'professional socialisation', and this research technique was utilised during the main research study. However, when considering whether computer mediated conferencing encouraged professional socialisation it was necessary to be more circumspect about the conclusions drawn from the initial study. There was less evidence to suggest that this medium would encourage professional socialisation. The students were only able to express their thoughts and opinions, and a more longitudinal study is necessary to determine the full extent in which computer mediated conferences encourage professional socialisation.

Introduction

This chapter presents the findings from the main research study and analyses these findings with reference to the two central research questions:

- Can computer mediated communication support and encourage reflective thinking?
- To what extent might this use of technology encourage professional socialisation?

To answer these questions a case study was conducted that investigated the use of a number of on-line discussion forums by a cohort of PGDE student teachers, and the extent to which their use of these forums facilitated, firstly, reflective practices, and secondly, professional socialisation.

This chapter describes how the main research study was conducted, and then the two research areas of reflective practices and professional socialisation are examined.

Main research study

This section describes how the main research study was organised and carried out. This is followed with a description of the 'test group' of student teachers who took part in this research, and then a description is given of the discussion forums and how they were used.

This section concludes with an overview of the student teachers' use of the discussion forums.

The main research study followed a similar structure to the initial study, described in Chapter 4. An on-line entry and exit questionnaire were used at the beginning and end of the PGDE course, to gather quantifiable data that would determine the student teachers' attitudes and experience of technology, in general, and computer mediated communication in particular.

The text message entries from the student teachers in the on-line discussion forums provided a prime source of qualitative data. A number of qualitative data analysis techniques were used to analyse the text messages from the discussion forums and address the central research questions; namely discourse analysis (Appendix F), grounded theory (Appendix G) and interpretative phenomenological analysis (Appendix E).

Eight focus group interviews were conducted during the main research study to explore key questions that arose from the questionnaires and the analysis of messages from the discussion forums. The focus group interviews were carried out using two of the tutorial groups, which involved the most (Nigel's tutor group) and the least (Anne's tutor group) active of the on-line discussion forums (refer to Table 5.1), and were held at the end of semester one and at the end of semester two. For the purposes of the focus group interviews, Nigel's and Anne's tutorial group were split into two, alphabetically based on the student teacher's surname resulting in two focus group interviews, of between six to eight students, being conducted on the same day for each of these tutorial groups.

| Forum | Discussions | Messages |
|-----------------------|-------------|----------|
| Tom's tutor group | 5 | 51 |
| Rose D's tutor group | 13 | 66 |
| Mary's tutor group | 4 | 57 |
| Paula's tutor group | 11 | 66 |
| Anne's tutor group | 4 | 25 |
| Anthony's tutor group | 9 | 64 |
| Rose M's tutor group | 11 | 57 |
| Maeve's tutor group | 3 | 54 |
| Nigel's tutor group | 23 | 114 |
| Angela's tutor group | 13 | 72 |
| Total | 96 | 722 |

Table 5.1 The quantity of student messages in each tutor group.

Semi-formal interviews were used to obtain specific and in-depth answers from the student teachers. They provided opportunities to investigate revelations that were made in focus group interviews, to 'tease out' insights and explore issues in greater detail; a total of four semi-formal interviews were held with student teachers. In addition, three tutors were interviewed to discover their thoughts on using discussion forums with members of their tutorial group (Appendix D).

Test group

The test group for the main research study consisted of the full 2008-2009 cohort of 160 student teachers, enrolled on a one year PGDE course, at NUI Maynooth.

It was noticeable that greater numbers of the student teachers taking part in this research owned their own computers, than the students who took part in the initial study. 90% of the student teachers from this sample owned their own computer, as compared to 38% of students from the initial study. This was probably due to the recommendations given to all new student teachers at the start of the year, which encouraged them to purchase a computer, something that had not been recommended in the previous year when the initial study was carried out. 95% of the student teachers with their own computer owned a laptop computer, which many thought was as an important tool for a classroom teacher. These students brought their laptops into Maynooth to avail of the free wireless Internet access on campus and so consequently had greater opportunities to avail of various on-line resources and discussion forums than the students from the initial study. It was also noticeable how greater numbers of student teachers attending the PGDE course during the year of this study brought their own laptops into lecture halls and seminar rooms and integrated their use of a computer into their coursework studies to a far greater extent than in previous years. For example, every student teacher attending the Educational Technology lectures, seminars and workshops arrived with a laptop; most brought their own laptops into these sessions, the remaining 10% who either did not own their own computer or own a desktop computer 'signed-out' a laptop from the Education Department Resource Room.

Although the student teachers had greater access to computers than in previous years, they had not experienced greater use of computer mediated communication. Many of the student teachers had not used on-line forums as a component of their previous educational courses. Initially, most students expressed concern in using technology to communicate with each other and with their tutors, but after the induction training 97% of students thought it would be useful in their tutorial work. During the induction training the student teachers quickly became familiar with using the on-line forums and were quick to

appreciate a potential use of this technology within their teaching practice school, with 96% being interested in using on-line forums with their pupils. This reveals the positive attitude the student teachers had to using on-line forums both as an aid to their own learning and also as a pedagogic tool within the classroom.

During the focus group interviews students were asked to think back to when they first learnt that computer mediated communication was going to be a component on the PGDE course and to describe their initial feelings. Some typical responses are listed below.

I was petrified, purely because I hadn't used that sort of system before. I had always been in direct contact with the lecturers and other students.

I would agree. I was very worried about using it as well. I found the whole concept very daunting. I thought that the fact that I wasn't very computer literate would work against me.

I was worried I would not be able to use it and if I had any trouble I would find it difficult to find someone that would help.

I thought 'oh that's different' and began to wonder how I would cope.

(Student teachers' responses from focus group interviews)

These responses show that the students had concerns about the unfamiliarity of the technology and their lack of experience in using it. Other student teachers expressed fears of being disadvantaged, due to their paucity of technological expertise. Some students expressed concerns that a dependence on technology might reduce opportunities for more direct face-to-face communication on the course. Many of the fears and concerns that

were expressed were based on the stereotypical and pre-conceived ideas about the use of technology, and were not fears and concerns that were grounded from the student teachers' knowledge of VLE's and computer mediated communication.

Discussion forums

The PGDE students were given access to a variety of general subject on-line discussion forums. For instance, the various modular subjects on the PGDE course had their own separate Moodle areas, which contained various forums and resources and these were monitored and administered by the relevant subject tutors. The forums of particular interest to this research project are the ten tutor forums that were created for the ten tutorial groups, with each group being between 14 –17 students. This section describes how these tutorial forums were used.

At the start of the academic year a meeting of the course tutors was held where the use of Moodle forums within the tutorial programme was considered and discussed. During this meeting the purpose and scope of this research project was explained and the co-operation and support of the tutors was requested. The tutors responded positively, all agreed to participate and agreed to facilitate the use of on-line forums to encourage reflective communication and develop professional socialisation. A variety of topics of future on-line discussions were introduced and discussed, as a result of which the tutors received a series of articles taken from Irish newspapers during the previous six months that focussed on contemporary topics in Irish schools. These articles covered such issues as: pupil bullying, school violence, under-aged drinking, pupil truancy, rise in fee paying school sector, leaving certificate examinations, inappropriate school curriculum, demands of non-national pupils, gender gap in school performance, home teaching, unfit and unhealthy pupils, and cyber bullying. The tutors agreed to introduce these issues and post these

articles into the tutorial forums and ask the students to express their thoughts and opinions in a forum message for the other students in their tutorial group to read.

During the academic year when the main research study was conducted, 2007-2008, 96 separate discussions were held within the tutorial forums and the number of separate postings, or messages, within these discussions varied from one to thirty-four. Table 5.1 shows the quantity of discussions and messages in the different tutorial groups.

The activity displayed in the forums by my tutor group (Nigel's tutor group) shows how influential the role of the tutor was in this research project. For example, throughout the year I made repeated reference to on-line communication and frequently encouraged the students to reply to messages. Consequently, members of my tutor group made significantly more postings than the students in the other tutorial groups.

During the main study each tutor initiated the tutorial forum discussions, by placing a message that the students read and then responded to. For example, the students were asked to think about whether it might, in certain cases, be more beneficial to educate children at home and to consider what the 'hidden' curriculum might be in their teaching practice school. An example of this type of tutor led discussion appears in figure 5.1.

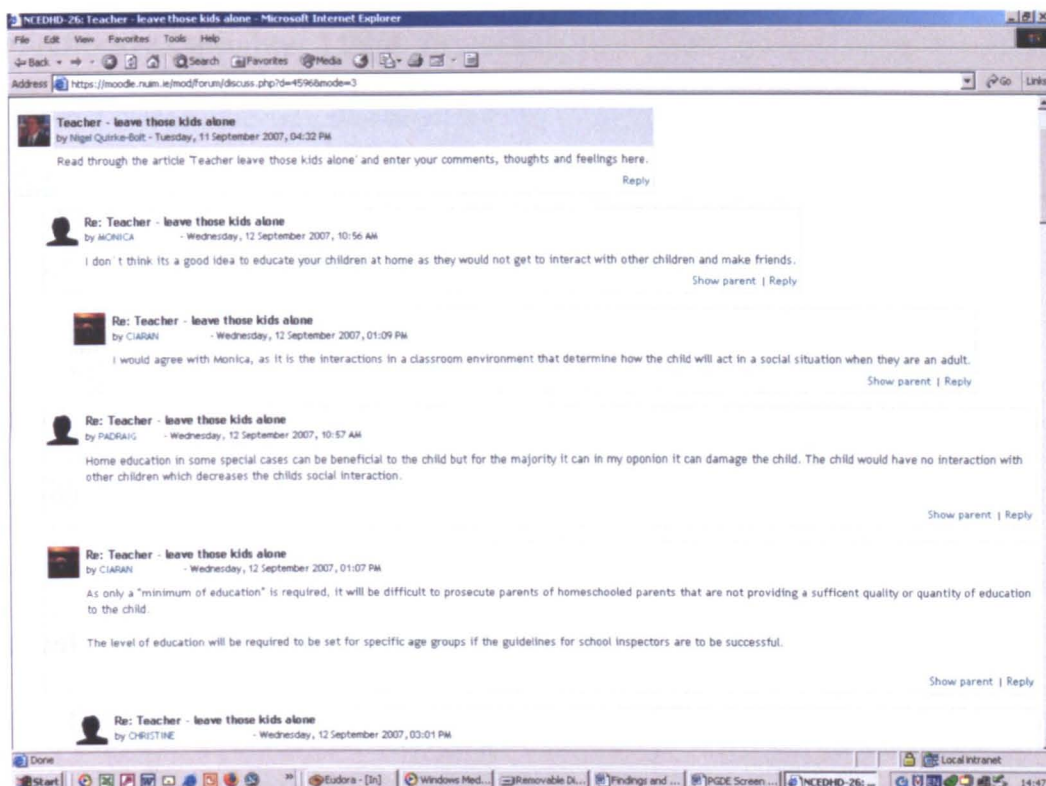


Figure 5.1 Example of a tutor led discussion.

Discussion Forums and the student teachers

I found it interesting to consider the students' experience of on-line communication during this research, because it revealed the factors that motivated their interaction and reflection in the on-line discussion forums. A key motivating factor was assessment, the student teachers were quick to find out whether their interaction in the on-line forums would be assessed, and they were much more relaxed about participating in the on-line forums when they found out they would not. Although, some students thought if they had been assessed this would have lead to more interesting conversations. I believe the students would have been much more diligent and forthcoming in posting messages if their communication in the forums had in some way formed part of their coursework assessment. However, I am not so sure that pressurising the students into communicating in this manner would have encouraged them to write more 'interesting' messages, or helped them to develop a

stronger reflective capability. I think the students who asked for their work in the forums to be assessed were requesting this more for the recognition of the time they had spent in the forums, perhaps coupled with their assessment driven experience of school and college education. This led to the interesting discovery that their goal in studying on the PGDE course appeared to be focussed towards gaining high grades, and not on developing themselves as teachers. The idea that there were important components of learning that are outside what is assessed was an unfamiliar concept for many of them.

The student teachers' experience revealed that there were a number of positive characteristics of on-line forums that aided their communication. For example: the forums helped to reduce the social biases and prejudices that arise through visual cues, such as personal appearance, and which were more likely to be present in face-to-face meetings; the forums gave them more time to consider a response when replying than they would have had in a physical meeting; the forums fostered a sense of collegiality and climate of shared togetherness with a wider audience than was experienced through face-to-face communication.

The student teachers also described some negative aspects of their experience. The most frequently reported aspects were that they spent much more time than they intended reading messages and they felt anxious when they didn't receive replies to their messages. 'Time' was a key issue that was repeatedly mentioned by the student teachers. The students were attending a course that they regarded as being stressful, due largely to dual weekly demands of attending college and working on teaching practice in school. The student teachers often described that they had insufficient hours in the day to meet the demands that were placed on them and this affected their level of activity and performance in the forums. The lack of time did cause the students stress, although it was noticed that the majority of student teachers did log-on to Moodle to access and share classroom

resources, 97% of students managed to post and reply to at least five messages in the various forums.

The student teachers also described that the user-interface of Moodle made it difficult to check through forums and see if others had responded to a discussion they had joined. This difficulty with the user-interface was addressed midway through the year of the main study, at the end of semester one, when it was decided to utilise an option within Moodle that gave the student teachers an emailed daily summary of messages posted to forums they had contributed to.

Reflective learning

The initial student feelings about using on-line forums showed that they generally appreciated the reasons for their use and were motivated to interact with their peers within this medium. The communication and interaction of the students within these forums is an important focus of this research, but more specifically the research focuses on the question can on-line forums be used to facilitate reflective learning?

Chapter 2 described the ambiguities that exist in the literature around the term 'reflection', and that there is not a common definition that is widely accepted. However, the works of Dewey (1933) and Schön (1982) have both been very influential in shaping a description of reflection for this project. In essence, they describe that reflective thinking means rethinking experiences to better understand them and to gain insights for subsequent experiences. Coupling the work of Dewey and Schön with Feldman's (1997) view of the importance of a social and collaborative component in the process of reflection has provided a useful point of reference that was adopted for this research study.

A particular purpose of the students' activity in the on-line tutorial forums was to encourage reflective thinking on various contemporary educational issues. It was hoped this reflective practice would involve the student teachers in a process where they would read the forum messages and try to determine their meaning by recognising the feelings, interpretations and judgments of their peers and then reply with their own perspective as a developing student teacher. It was also hoped that the student teachers would, over the course of the year, develop their capacity to engage in this on-line reflective activity and develop and strengthen their critical thinking skills.

During the focus group discussions a number of positive effects were identified by the student teachers of their use of a VLE as a communication tool. The majority of students described how communicating on-line helped them appreciate how this form of technology could be used to support their study on the PGDE course, develop their technological capacity, improve their reflective practice and provide them with a broader educational experience.

I think it's quite nice because you can actually think about what you're communicating as opposed to talk, when you're writing something down you can edit it and communicate more precisely.

You think about what you're gonna say before you write it.

I don't think I've changed my mind but I'd go ...Oh I've never thought that way. So that's one way you could look at it....

(Student teachers' responses from focus group interviews)

The student teachers described in the focus group interviews how the forums helped them to develop their own reflective thinking and encouraged them to prepare better informed responses to questions, issues and aspects that were raised and discussed within the on-line communication. The students also described how they valued the opportunity to learn and communicate in collaboration with others, which suggests that they had developed both their on-line social constructivist and independent learning skills. The comments from the students sounded positive, and suggested that the discussion forums did encourage reflective thinking, but if this was true, to what extent? To answer this question attention was turned to the actual text messages that the student teachers placed in the discussion forums.

The next section presents an analysis of the extent to which the student teachers engaged in reflective thinking in the on-line forum discussions, using Gunawardena *et al.*'s (1997) 'Interaction Analysis' (IA), as described earlier in the Research Methodology chapter.

On-line forum message interaction analysis

Using the interaction analysis developed by Gunawardena *et al.* (1997) in this research's main study involved reading the 722 messages from the on-line forum discussions and placing each separate message into one of five categories. These categories were: sharing or comparing information; discovery and exploration of dissonance or inconsistency amongst ideas, concepts or statements; negotiation of meaning/co-construction of knowledge; testing and modification of proposed synthesis; application of newly constructed meaning.

The tutorial forum messages were viewed in the order they were posted and initially classified into one of Gunawardena *et al.*'s five categories. The messages were then re-

read to try and detect if they could be interpreted differently, and as a result some messages were moved from one category into another category. Many of the messages fell into more than one category, and where this occurred they were placed into the highest one.

Typical examples of messages that were classified under the first heading, 'sharing or comparing information' are given below.

I think educating kids at home is daft, because they'll miss out on so much they could have done at school.

Teaching children at home is not something that I'd recommend; teaching should be left to the experts!

(Student teachers' responses in an on-line forum discussion)

These examples show how the student teachers shared their thoughts; the messages in this category typically were simple statements. The student expresses an opinion that supports the view of the message they are replying to, and communicating in this category involves limited reflection.

Typical examples of messages that were classified under the second heading, 'discovery and exploration' are given below.

I can think of cases when teaching at home would be beneficial. Some children might need the extra support that really only a parent would be willing to give.

These kids wouldn't have nearly the same amount of support in school, I have some in my class that need a lot more attention than I am able to give and they'll

probably end up doing badly, because we haven't the time or the resources to look after them.

I think it is sad to think that there are parents that think it would be better for their kids to be educated at home. This is like a big vote of no confidence in their school. It must be a huge step for them to actually do it, take their kids out, its sounds more like a cry for help than anything else.

(Student teachers' responses in an on-line forum discussion)

The above examples show that the student teachers were not just expressing an opinion, they were reflecting and thinking about the topic under discussion and then expressing their emerging thoughts in the form of an argument. The examples of this category that were found in the discussion forums invariably referred to the students' personal experiences and argued either for or against something.

Typical examples of messages that were classified under the third heading, 'negotiation and construction' are given below.

I agree with you [name removed], that it might be better to educate the pupils at home, but is education all about academic results? The other aspects of education such as the personal development of the pupil, team working and social skills are all aspects that should also be considered.

I feel that there is far too much pressure on teachers. The responsibility of educating and developing each kid in the class during each lesson, throughout each day is so enormous. There are bound to be times when I won't be able to live up to either the expectations of the parents, or the expectations of myself. If I want to

teach like I know I should, it takes everything from me and I seem to pay such a high price – I find it all overwhelming sometimes.

(Student teachers' responses in an on-line forum discussion)

This category is where the student teacher presented their thoughts, and then moved the discussion onto a new level of meaning or knowledge. This category involved the students broadening the discussion to consider new insights, ideas or information and proposing new definitions or lines of discussion.

Typical examples of messages that were classified under the fourth heading, 'testing and modifying' are given below.

What we really need to consider in thinking about the issue of home schooling is the effect of this on the individual pupil. I have come to believe that each case should be judged separately and considered in the light of all the facts. I am sure there will be cases where home schooling is a valid and desirable approach and where it is the parents should receive the full support of the educational community.

(Student teacher's response in an on-line forum discussion)

The above message came at the end of a long threaded discussion that included a broad range of different opinions. The student who posted this message had previously argued against 'home schooling', but had modified their initial position and had synthesised other contributors' views in reaching their eventual position described above. It was found that messages within this category could not be judged in isolation of the other comments posted in the discussion.

Typical examples of messages that were classified under the fifth heading, 'applications of new meaning' are given below.

The route that this discussion is taking shows that it is not whether 'home schooling' is a good thing, but what really matters is how effective it is. The general discussion on this needs to become specific, there is no general solution or right answer. In some cases, like the ones mentioned by [name removed] there is a strong case for home schooling, but in others, such as [name removed], then the solution is less clear. The holistic effects on the individual pupil are often hard to predict, but it is the duty of the school to try to do so.

(Student teacher's response in an on-line forum discussion)

This message also needs to be read in context with the messages that preceded it and the ones it references. The above message refers to a new concept that emerged from the discussion, which was the 'effectiveness' of the approach, then modifies it slightly, summarises the prior discussion and then presents a 'newly constructed meaning' to the discussion (Gunawardena *et al.*, 1997).

The responsibility for engaging in reflective practice in the discussion forums was given to the student teachers; each tutor initiated the topic or focus of discussion and the students responded. The interaction that the students engaged in through their discussions within the forums provided a rich and complex source of data in which to explore the reflective process. The results of this analysis have been summarised in table 5.2.

| | Sharing and comparing | Discovery & exploration | Negotiation & construction | Testing & Modifying | Application |
|------------|--------------------------|----------------------------|-------------------------------|------------------------|-------------|
| Messages | 593 | 66 | 45 | 16 | 2 |
| Percentage | 82% | 9% | 6% | 2% | >1% |

Table 5.2 ‘Interaction Analysis’ of messages posted in tutorial forums.

A large percentage of the messages sent by the students (82%) fell within the ‘sharing and comparing’ category. This suggests that the students preferred to share and corroborate knowledge between each other that reinforced their existing perceptions and levels of understanding. Many of the messages that were sent within this category could be described as ‘social interchange’ (Kanuka and Anderson, 1998), where the students made a statement and brief comment, but didn’t engage in an exchange of ideas or reflective conversation. During the focus group discussions the students consistently reported that they had learnt much through their on-line interactions. However, if learning, as described by the constructivist approach, is an active reconstruction of new knowledge and prior knowledge (Brooks and Brooks, 1995; Crowther, 1998) then the above table shows that the majority of messages (82%) did not involve any significant learning actually taking place.

The figures in table 5.2 would further suggest that the students’ preferred learning style was sharing, comparing and confirming information, which perhaps is understandable, given the student teachers were feeling their way into the accepted norms of behaviour of the teaching profession.

However, the fact that so many messages were grouped within the one category suggested either: that the practice of the tutor initiating a discussion/question and the student teacher responding did not encourage the deeper levels of reflective thinking as categorised in Gunawardena *et al.*'s (1997) interaction analysis; or that this 'interaction analysis' did not accurately measure the student teachers' levels of reflection. Whilst I was classifying the forum discussion messages I began to question the relevance of Gunawardena *et al.*'s (1997) categories and their use on this research study. I felt that these categories did not help to identify the reasons for the student teachers' reflective learning from on-line communication. I also felt that a different classification that utilised a different focus might help to identify the reasons for and also the components of the students' reflection. Consequently, to understand more fully the student teachers' reflection that took place within the on-line forums, I decided to re-examine the 82% of student messages that had fallen in the lower level of reflection category, 'sharing and comparing', with a view to producing a modified method of categorisation of these discussion forum messages, and this is described in the next section.

Secondary analysis of on-line forum messages

The 593 messages that had been categorised into Gunawardena *et al.*'s (1997) 'sharing and comparing' category were re-examined using a grounded theory approach, as described in the Research Methodology chapter. This resulted in the identification of a number of distinct sub-categories of reflective activity. The grounded theory approach involved: firstly, identifying the reflective concepts that these messages contained; secondly, grouping these concepts together into common areas to form common categories. The last stage was to produce propositions that indicated a relationship between a category and its associated concepts. For example, the concepts of 'conversations', 'questions', 'academic banter' were identified and then grouped into a discrete category which I labelled

'reflective inquiry', the concepts of 'exchange', 'experiences', 'thoughts' and 'opinions' were grouped into a category called 'reflective sharing', the concepts of 'referencing', 'lectures', 'earlier forum discussions' were grouped into a category called 'reflective reading' and the concepts of 'analysis', 'reasoning', 'logic' and 'evaluation' were grouped into a category called 'analytical reflection'. The four categories that resulted from this process suggest a hierarchy of reflection similar to that found by Gunawardena *et al.* (1997). These categories of reflective activity are described below and include examples taken from the on-line forum discussion on 'the advantages and disadvantages for the pupils of parents who withdraw their children from school and educate them at home'.

1. *Reflective inquiry*

This category involved the tutor initiating a question and encouraging the students to think about an educational topic and to respond and present their thoughts in an on-line forum. The tutor's question was intended to be provocative, to encourage a response from the students, and required the students to think about their own viewpoint and formulate an opinion and communicate it to the others in the tutor group. The students explored and developed their understanding of various topics, drawing upon their growing understanding of various educational issues, the content of their course lectures and their experience within the teaching practice school. A particular characteristic of this category was that the tutor's question frequently prompted questions in the answers from the students, because as the student teachers considered their answers they often needed to ask further questions. For example:

Maybe (big maybe) most parents could cope with primary education but secondary is much more difficult and parents may not be able to provide adequate guidance, assistance. How is this evaluated?

I believe that the opinion, attitudes and reasons of the parents in question are paramount. If parents appear to be home schooling their children solely to keep their children from school, serious questions need to be raised. For example, how important do they perceive education to be?

Surely social integration is every bit as important as curriculum, should the child not have the opportunity to explore and discover a world outside the home?

Before this course I was not aware about home schooling in Ireland, but I know that in Boston home schooled children can join the local school sports and debating teams. Also there is an on-line forum in which parents of home schooled children can contact each other and arrange educational and social outings. Also if a parent cannot help their child in a specific subject they hire a tutor to do so. Do you think this would address some of the concerns around socialisation and educational requirements?

(Student teachers' responses in an on-line forum discussion)

This category uses the traditional teaching technique of 'questioning' that the student teachers are taught to use in their classrooms, which involves asking questions that encourage and develop higher order thinking skills. However, during this research project the tutors asked just an initial question and the student teachers responded with their reflective thoughts and questions, whereas the tutors could have influenced and developed the emerging reflective themes to a far greater extent by asking a second, third and fourth question, just as they would have done in a classroom situation. The tutors should have applied their traditional teaching skills of questioning within the forum discussion, and by not doing this they lost a teaching opportunity.

2. *Reflective sharing*

This category was judged to be in evidence when the students read the reflective comments that were posted by another student(s) to the tutor's questions and which then influenced their thoughts, the evidence of which was visible in their subsequent contribution to the forum discussion. The student teachers' comments and responses in the forums provided a rich source of information on the various course-based topics that were discussed, and they presented an opportunity for the students to broaden their outlook and tap into the expertise and experience of the others. For example:

Excellent point [name removed], it is hard to imagine how 'home education' would be assessed to the same standards as formal education. Are we right to judge our education standards to that of just the classroom because that has been known to fail some students?

I think it is a thought provoking topic. I would agree with [name removed] and the view that there is more to school than purely academic achievement. [Name removed] is right in that the development of social skills, and recognising yourself in the community are major aspects in the development of pupils. I imagine education through a school environment aids this development to a much higher degree than home schooling.

(Student teachers' responses in an on-line forum discussion)

This form of reflection has similar properties to the 'community of practice' model. It is a form of reflection where the students contribute and share their reflective thoughts, from which others can then read, learn and contribute with their own developing thoughts, and so develop and move the discussion onto further levels of communal reflection. This

reflective ‘community’ discussion suggests a powerful conduit for a thread of reflection to be developed, which utilises the synergy of the reflective thoughts of the forums participants.

3. *Reflective reading*

This category was judged to be in evidence when the students referenced readings from the course lectures, and / or messages from other forums, where they articulated clearly deliberate expressions of their developing thoughts. When this category was in evidence it showed how the students were demonstrating a contextualisation of knowledge gained elsewhere and were then applying it to address the topic in the forum. For example:

What concerns me most about home education is the fact that parents are only obliged to provide an "unspecified" minimum, doesn't this come into conflict with the provision of the Education Act?

[Name removed] I think you've hit the nail on the head with the way in which parents might think they are helping their children by keeping them at home, either in the belief that it will aid their education better, or perhaps be a safer environment for them. However the central requirements from the Department of Education Science, which is that the children who enter the workforce are sufficiently skilled in the required curriculum, and by professional teachers specifically trained to do so. Which is why for the vast majority schools are better at this.

(Student teachers' responses in an on-line forum discussion)

This is a category that can provide useful feedback to the tutors of the student teachers' level of understanding of the more formal, theoretical, side of the course. If the student teachers are to engage in discussions on educational topics, they need to draw upon and apply the theories and concepts that are raised in their education lectures and course reading. The contextualising and application of theory, examples of which could be found in the discussion forums, is a useful indicator to the tutor that a student understands and appreciates the theory that they reference. This also highlights the importance of this category of reflection, because if the student teachers are to join the teaching profession, and take part in professional socialisation, they need to be able to reference educational theory and communicate on a range of educational topics, and contribute in educational discussions.

4. *Analytical reflection*

This category was judged to be in evidence when students evaluated and included reference to other student messages in their own contributions. The students frequently referenced the messages of others to strengthen and reinforce the points they made.

[Name removed], I absolutely agree. I feel very strongly about the benefits of social interaction outside the home as well - especially at such an influential age. Of course there are multiple benefits with regard to education in the home, in my experience parents who home educate their children do so to a very high standard, however, the same opportunity for a child to develop their social skills and recognise their gifts are not the same at home and in a school environment.

When I first read this article on the 12th of September I submitted the opinion that children needed and were entitled to social integration and to be a recognised part of their own community with an opportunity to explore and discover a world beyond their front door. After four weeks in an inner city school environment I wonder how beneficial really is the whole school experience.

A child or adolescent's experience in school is very important. [Name removed] school is not only an academic forum but a place where social skills are developed. These social skills are life skills that might have more to do with feelings, emotions, and confidence, for example, which academic performance alone cannot develop. Making friends and becoming involved with the community through school is vital and as I remember it happened for me in a way that could not have happened if I had been tutored at home.

(Student teachers' responses in an on-line forum discussion)

This category involves analysing and synthesising information and so utilises the higher order thinking skills described by Bloom (1956).

The 82% of tutorial forum messages, totalling 593 messages, that had earlier been placed in Gunawardena *et al.*'s 'sharing and comparing' category were re-analysed and categorised into the above four categories. The results of this new analysis have been summarised in table 5.3.

| | Reflective inquiry | Reflective sharing | Reflective reading | Analytical reflection |
|------------|-----------------------|-----------------------|-----------------------|--------------------------|
| Messages | 569 | 343 | 101 | 106 |
| Percentage | 96% | 58% | 17% | 18% |

Table 5.3 Analysis of messages using new categories.

This re-analysis involved individually analysing each message under each category and placing it into the most appropriate of the four categories. After the messages had been categorised they were then re-read to check the accuracy of this initial classification, which resulted in some messages being moved from one category into another. Some of the messages fitted into more than one category, and these messages were recorded in each of the categories they matched, resulting in the total number of messages across the four categories in table 5.3 exceeding the 593 messages analysed. The percentage figures in this table describe the total percentage number of messages falling into that category, for example: 96% of all messages contained examples of the student teachers engaging in ‘reflective inquiry’; 58% contained examples of ‘reflective sharing’; 17% contained examples of ‘reading reflection’; 18% contained examples of ‘analytical reflection’.

The high number of messages that fell into the ‘reflective inquiry’ category was due to the forum activity that the student teachers were engaged in. This activity involved the tutor initiating the forum discussion by presenting the students with a question for them to think about, to which the students responded by placing their thoughts in the forum discussion, an activity that closely described the category of ‘reflective inquiry’. The relatively high figure of 58% of messages that involved ‘reflective sharing’ was also symptomatic of this

activity, because as the students responded to the tutor's question the other students could read, learn and develop their own ideas and views from the other students' responses.

It was interesting to note that 17% of messages contained examples of 'reading reflection', which showed that a number of the students were cross-referencing information from other parts of the PGDE course to present their thoughts and ideas in the forum discussions. In addition, 18% of messages contained examples of 'analytical reflection' which showed how a number of the students were evaluating and including references to each other's messages as they contributed to the developing on-line discussions. These figures are interesting to compare with the 82% of messages in the 'sharing and comparing' category using Gunawardena *et al.*'s approach, which suggested minimal reflection, as this re-analysis revealed that the students were actually engaged to a greater extent, in a range of reflective practices that involved inquiry, sharing, reading and analysing.

These figures are useful to consider because they help to identify the reflective components of the student teachers' messages, and also suggest how the student teachers' reflective capacities could be improved. For example, the tutors could encourage the students to reference theoretical concepts and the texts from the literature to a greater extent, with a view to increasing the number of messages that contained evidence of reading reflection, and likewise with the other categories; this is explored further in the next section.

The use of Moodle to encourage the process of reflective dialogue has shown the potential of this medium in encouraging a reflective interactivity between students, but it has also shown that whilst the technology provides an accessible medium for higher order educational goals, the role of the tutors in using this medium is a key component. The reflective interactivity between the students required more effort on their part than simply posting messages into a forum. The medium of computer mediated communication does

not encourage interactivity and reflective practices amongst the student teachers on its own, numerous other components are involved; two important factors in this project have been the role of the tutor and the relevance of the communication activity that the student teachers are engaged in, which is discussed in detail in the analysis section below.

Other factors involved in encouraging an on-line reflective interactivity included the initial training of the student teachers and the university's approach to using a VLE as a course component. If this project is to be developed in subsequent years, these components need to be considered and the tutors, university, teaching practice schools and students need to collaborate and nurture the development of the students teachers' reflective on-line capability. It is important that the students continue to develop this capability as their teaching careers progress and build it into their practice of professional socialisation, which is mentioned in more detail later.

Analysis of reflective learning

This section discusses the factors that influenced the student teachers' reflective learning from this research study. These factors include the profile of the student teacher, the guidance and support from the course staff and the tutors' teaching approach. In addition, improvements for the student teachers' reflective learning through on-line forum discussions are also suggested.

The profile of the student teachers who were most likely to use on-line communication were found to be independent and experienced computer users who were motivated, organised and disciplined in their study of the course materials. These students could find the time to access the VLE and liked to solve problems, they were technologically competent and used to using computer technologies and the Internet.

During the semi-formal interviews that were held with the tutors, some tutors suggested that the students needed guidance in the use of forums for reflective communication and reported that the attitude of the student teachers appeared to focus primarily on obtaining information rather than engaging in the interactive opportunities that the medium provided. Data from the student teachers supported this view. The students often mentioned that they didn't have time to fully engage with the messages that were posted in the forums, and this often resulted in the students hastily reading the forums and not always engaging in the more time-demanding activity of reflective thinking. Reflection takes time and the student teachers were not always willing to allocate their time to engage in reflective processes.

The findings from this research suggest a new approach that is appropriate in measuring the student teacher levels of reflection from on-line discussion forums; an approach that uses categories that were labelled reflective inquiry, reflective sharing, reading reflection and analytical reflection. These categories characterise different activities that the student teachers engaged in while using the discussion forums, and it is interesting to think that if these activities had been encouraged and promoted to a greater extent by the tutors then the students would have achieved greater levels of reflection.

Using on-line communication presents several different options for the tutor to guide and manage the educational process. The process that was used by the tutors on this research project was to initiate discussions by asking questions, and to let the student teachers interact and communicate amongst themselves. However, a consequence from the findings of this research is the suggestion of a different teaching approach that would appear to be more suited to encouraging the students' reflective practices in on-line discussion forums.

Such an approach would be to target the four new reflective learning categories that

emerged from analysing the discourse within the on-line forums, and which might have been more effective than the approach used by the tutors in this study. For example, the tutors initiated communication in the tutorial forums by presenting their tutorial group with a question, to stimulate their students 'reflective inquiry'. However, this initial question was not followed up with a second or a third question from the tutor, which resulted in a wide range of student-led discussions, some of which were more focussed, richer and more reflective than others. This lack of guidance on the part of the tutor could have feasibly resulted in discussions where the 'blind led the blind', and supports Salmon's (2003) view of the importance of the tutors' skills in moderating on-line discussions. For example, a particular skill that the tutor needs to develop is the timing of their input to the discussions. The tutors' contribution should be to moderate the students' communication and to keep the discussion flowing and encourage responses from the student teachers, giving the students enough space and time in which to develop their own thoughts (Salmon, 2003).

The 'reflective sharing' category is one that draws upon the communal sharing of knowledge. This category is encouraged by the properties of the on-line forum, which presents the students' messages within a series of 'threads' that allow the students to read each other comments over a period of time. The powerful characteristic of the 'reflective sharing' category is the sum of the knowledge of the group is greater than the individual parts. The teaching approach that the tutor needs to try to adopt to encourage this category is to involve all the participants so that each member of the discussion group shares their own particular knowledge and expertise.

The 'reflective reading' category is a very useful technique for the tutor to encourage, as it can be used to signify the stage of the student teachers' development in understanding theoretical concepts. This category could also reveal problems and misunderstandings that the student teachers might have with certain aspects of the theoretical side of the course.

For example, the contextualising and application of theory, examples of which could be found in the discussion forums, is a useful indicator to the tutor that a student understands and appreciates the theory that they reference.

Consequently, I believe that if the on-line tutor referenced these four new categories and integrated them into their on-line forum teaching approach the tutor would be able to improve and develop the PGDE student teachers' reflective capabilities. I am not suggesting that the four new categories, as described above, replace Gunawardena *et al.*'s (1997) model, but believe there is a need for the two. The new categories are more appropriately employed with students who have little experience of reflectively communicating within on-line discussion forums, and whose on-line reflective capabilities are not developed and whose forum messages would probably be classified within the 'comparing and sharing group'. Using the new categories as an initial teaching approach provides the tutor with an approach in which to develop the reflective practice of these less experienced students. As the student teachers' develop their reflective capabilities a larger number of messages will begin to exhibit deeper levels of on-line reflection as the PGDE course progresses, and so resulting in a greater number of messages being categorised in the higher levels of reflection within Gunawardena *et al.*'s (1997) 'Interaction Analysis'.

Professional socialisation

The second area of investigation for this research project was the extent to which on-line forums could be used to engage and encourage professional socialisation. Outside of this project the student teachers experience professional socialisation through their interaction with university staff, other students and through the interactions with members of staff in their teaching practice school. Could computer mediated communication add another dimension to this experience?

Professional socialisation is important for the student teachers, because it helps them to understand the values, opinions and behaviours of other teachers in general and the school they are attached to in particular. Professional socialisation is an important part of the student teacher's rite-of-passage into a professional teaching career and helps them to establish themselves within the community they are joining (Schön, 1982; Bowen and Martin, 1998).

The focus of this section centres on the following areas:

- To explore whether on-line communication can encourage professional socialisation, and to understand the students' experience of professional socialisation from their engagement in on-line communication;
- To identify the causes and motivating factors of on-line professional socialisation amongst the student teachers.

Professional socialisation in the context of this project refers to the process where the teaching profession conveys behavioural expectations to the student teachers (Weedman, 1999). The socialisation process results in the identification and acceptance of values, attitudes and beliefs of the profession. For the new student teacher socialisation often occurs indirectly through the communication of experiences and examples involving the college, school and the other student teachers. This section describes the student experience in using on-line forum discussions and how their on-line interactions provided them with a professional socialisation.

The most commonly listed skills that the student teachers mentioned in the focus group discussions when they were asked about the benefits of on-line communication were:

negotiation, communication and collaboration. Another skill that few student teachers mentioned, but that was noticed by the tutors, was that of problem solving, particularly ill-structured problem solving. Well-structured problems are typically constrained with clearly defined parameters and have convergent solutions, whereas ill-structured problems have multiple solutions, fewer parameters and a level of uncertainty as to which is the right answer (Gallagher *et al.*, 1992). For example in the context of this research, 'ill-structured' problem solving involves the finding out of information to understand a problem that the students encounter as a result of their interaction on-line, and that the information they find out and then share changes the perspective and definition of the problem, frequently resulting in a number of different 'right' answers. This was particularly noticeable in the on-line forums when the student teachers were discussing solutions to classroom related problems that they were experiencing in their teaching practice school.

The problem solving element of on-line communication was particularly welcomed by two of the three tutors interviewed, they recognised that many students experience thoughts and feelings of being under prepared for their future careers and life in the classrooms.

Many students are overwhelmed and confused by the situations they experience in their early years in teaching.

The conversations they have in Moodle help them to contextualise the information from the lectures and apply it to their experiences in school, helping them to solve their own problems as they learn from the experiences of others.

(Tutor responses from semi-formal interviews)

This last comment refers to a problem that is often expressed by teacher-educators, that their courses can present a fragmented view of learning, because the various subjects

within the PGDE course are taught separately and focus on de-contextualised educational theory. By building the students' problem solving capabilities through the collaborative discussions of problems they experience in school and in college, within a framework of professional socialisation, the tutors thought the students would be better able to cope with the adjustments necessary to work within new and possibly different classroom and school cultures in their early teaching years.

The students commented during the focus group discussions that the tutorial forums had helped to strengthen a community atmosphere amongst the group. They mentioned that the shared experience of communicating on-line encouraged a sense of 'team building'. Many of the students mentioned how they related to the experiences and stories that other students described from their teaching practice schools and that this created a sense of 'belonging' and 'empathy' with the group.

The tutorials are only once every two weeks, whereas the Moodle forums are 24/7. So you are able to keep in touch with the group in between tutorials and can keep in touch with what everyone is doing and are aware of what they are getting up to in their schools.

I thought that some of our group made some really interesting comments in the forums, and it got to the stage where I put things in just to see what their opinion would be.

Moodle definitely helped to keep us all in touch with each other, and we would have lost a valuable method of contact if it hadn't been there.

(Student teachers' responses from focus group interviews)

Most students described how they felt a sense of ‘ownership’ of their on-line tutorial group forums and how they felt comfortable communicating in a group where they knew everyone personally. The students described how they felt the other forums within Moodle were much more ‘business like’, often focussing on sharing resources or course information in a factual, impersonal style, whereas the tutorial forums were found to be ‘personal’, friendly and supportive.

Our [tutorial] forum was a place where you could get advice and receive help and support.

I think if you can work in a place where you belong you work better, Moodle helped me to feel that I belonged with this group of students, and largely as a result of this I think I have worked harder and better on this course than on anything else.

The best thing about the [tutorial] forum was that positive affirmation that you’d get from the others, we were all very supportive of each, like when we all told [name removed] that she had done the right thing!

(Student teachers’ responses from focus group interviews)

This last comment referred to a problem a student posted on the tutorial forum describing how a group of the pupils in her school had said they thought she was having a personal relationship with another member of staff. The tutor and the other students were very quick to offer support and advice to the student; this can be seen in the initial thread to this conversation, which is shown in figure 5.2.



Figure 5.2 Example of the support given to students in the tutorial forums.

The forums helped to develop a collegial atmosphere and reinforced how the students were going through very similar experiences and how these experiences were at times having an unsettling effect on the students. The use of the forums shown in figure 5.2 reveals the level of trust that existed between the students and tutor and this example highlights a degree of comfort in using this on-line medium as a method of communicating a sensitive and personal topic. This theme of trust was apparent throughout the year, becoming more evident as the year progressed, and the friendship and notion of the tutorial group community that were first formed during the early face-to-face tutorial meetings were strengthened and developed during the on-line exchanges between students.

The student teachers made use of the on-line forums to clearly express their opinions. Students who were reluctant to freely express themselves in the tutorials were often much more forthright and confident in expressing themselves in the forums.

You don't always get a chance to say something, the tutorials are so short [an hour] and they contain so much and they move so fast that not every one can speak.

During some tutorials it is hard to get a word in edgeways, and it is not physically possible for everyone to express themselves on everything that comes up.

I don't always have a strong opinion on things that are discussed in [face-to-face] tutorials. Moodle is much better for me because it gives me time to think about what the others are saying.

(Student teachers' responses from focus group interviews)

The majority of the student teachers believed the forums gave each student an equal opportunity to express themselves, which some students felt the face-to-face tutorial meetings did not. This feature of equality within on-line discussion forums is significant, because it helps to promote the ideal that every participant's contribution is important and encourages a wider active participation that leads to a more vibrant on-line community.

In addition to providing equality and opportunities to communicate in a professional and considered way, the forums also provided communication that reached a wider audience than face-to-face communication. Through reading the comments and interactions in the on-line forums the students began to appreciate the cultures from different schools, teachers and classrooms outside of their own teaching-practice experience. The discussion forums brought the student teachers into contact with a larger number of students than was possible through physically socialising with their peers on campus, and in the college organised face-to-face meetings, and facilitated the 'socialisation' of the student teachers with the entire cohort of PGDE students.

Reading about other people's problems meant that I was forearmed and ready for such things happening in my school.

A benefit of the Moodle discussions show how one school is very different from another and it is great to be aware of these differences, because it gives you a bigger picture of what teaching is like.

I have a very young family and I can't be in the college and in the library and meet people as much as I would like to. The forums allow you to look at things in the evening time; it's like having a conversation with the group, which I didn't get the opportunity to meet earlier.

(Student teachers' responses from focus group interviews)

However, encountering a wider group through on-line interaction also raised concerns. For example, a key element in the student teachers' on-line 'socialising' was the relationships they developed with each other outside of the on-line forums. The data from the focus group discussions revealed that the student teachers were more inclined to engage in on-line discussions with others to whom they felt more socially connected.

It is a lot easier talking to people in the forums that you know.

Some of the topics in Moodle have been very personal and I wouldn't like talking about some things to just anyone.

(Student teachers' responses from focus group interviews)

Social network theory suggests that the more closely people are socially connected, the more intensely they communicate using whatever media is available to them (Wellman *et al.*, 2001). The implications of social network theory are that the quality of on-line social communication can complement or be an extension of traditional social behaviour. In other words, computer mediated communication can be used to supplement traditional social behaviour, without necessarily increasing or decreasing it, as the students adapt new technologies to extend and expand their traditional forms of social interactions (Wellman *et al.*, 2001). Consequently, although on-line communication can bring students into contact with larger numbers, it does not necessarily follow that the quality of their 'socialisation' also increases.

A key factor in the professional socialisation of the student teachers is the professional role models that the students come into contact with. These role models are the staff in the university, the teachers in the school and the other student teachers on the course. It is important that the student teachers have adequate opportunities to socialise with these groups during the course. The on-line forum discussion provided a point of contact that was always available, while the student teachers were in school and in the university. It was valuable to create opportunities for the students to engage with this media and to enter in a dialogue on certain aspects of their professional socialisation.

The students became aware as the course progressed that teaching requires a high-level of skill and practice and that their success on the course and in school depended on them identifying and acquiring these skills quickly. The students were invariably quick to appreciate how the other students on the course provided a rich and valuable source of advice, help and support. By using on-line communication the students were able to contact any other student on the course, something that was not entirely possible during the course of a normal student day in the university. By posting a problem in a forum the

students could potentially receive up to 160 possible suggestions. As the course progressed the students began to appreciate the potential this offered to their work within their teaching practice school and a large number of the messages posted within the PGDE area of Moodle focussed on the exchange of classroom resources and teaching aids. During the second semester of this two-semester course the students asked if subject resource areas could be made available and set-up in Moodle, where they could exchange lesson plans and resources within subject specific forums. These collections of resources subsequently proved to be the most frequently visited areas on the VLE by the students.

It was hoped that by using the medium of computer mediated communication during their training the student teachers would be more likely to use this form of communication after they have qualified, when they are working full-time in a school. A growing number of subject associations in Ireland are creating on-line areas for their members to communicate and share resources and ideas with each other. 89% of student teachers said in the exit questionnaire that they would feel very comfortable using such areas in the future. This suggests that the students were beginning to develop an independent capability in the use of on-line resources and forums and that the possibility exists they would continue to develop their capacity to engage with computer mediated communication and become more autonomous learners and assume a greater role in developing their own learning and education (Austin and Anderson, 2008; White, 1996), something that will be important for them if they are to become successful teachers.

A high percentage (78%) of the students felt that they would continue to use on-line communication after they completed the course.

Initially it might have been a little bit contrived, but it is good because it just shows what we could do in the future if we wanted to work on projects and things like that later on.

In the future I expect that I will use electronic forums to exchange classroom ideas and resources, but will probably not use them to exchange experiences, as has been done this year.

(Student teachers' responses from focus group interviews)

The above comment is probably indicative of the student's perception of their stage in the journey that they have made into joining the teaching profession, where they believe the focus for qualified teachers' is probably on their development of classroom practice, with less emphasis being placed on their individual growth. However, some of the student teachers said that they thought many teachers working in schools were unaware of the potential on-line communication offered and they believed that on-line professional socialisation between teachers was not something that was widespread. This suggests that student teachers could have an important role to play in informing and developing new practices in schools.

Professional socialisation in context

The previous section described the PGDE student teachers' experience of using on-line communication and this description has led to the identification of a number of features of this form of communication that have influenced the students' professional socialisation.

The professional socialisation that the students experienced as a result of using the on-line discussion forums during their year on the PGDE course led to them developing a number

of characteristics, which they will take with them as they leave college and begin their teaching careers. For example, the tutors reported that the collaborative exchanges in the forums helped to develop the student teachers problem solving capabilities, as the students read the messages that described the others students' experiences it helped them to contextualise new information, apply it to their situation and formulate answers to their own problems.

The experience and socialisation of the student teachers within the on-line forums helped to develop their thoughts, values, attitudes and beliefs of the teaching profession. The student teachers described how the forums provided them with a community atmosphere, a sense of being part of a team, a large contact group that provided a rich and valuable source of support and advice, and a forum of mutual trust where they could communicate in confidence with other like-minded individuals. All of which are described by Kuzmic (1993) and Rust (1994) as valued ideals within the teaching profession.

The student teachers' experience of the on-line forum discussions has revealed a number of findings. The students believed the forums helped to improve their skills in negotiation, communication and collaboration. The student teachers also commented that the tutorial forums had encouraged a collegiality within their tutorial groups, and that they felt the tutorial forums provided a supportive structure in which they could communicate on both personal and professional matters with each other. The elements of personal and professional communication, collaboration, collegiality and support that the student teachers mention are the necessary constituent parts of a professional socialisation network (Weedman, 1999) which would suggest that the discussion forums can be used to support professional socialisation, although it should be stressed that the channel of on-line communication should not be used in place of other forms of communication, but as a

valid method of communication amongst many that can support the socialisation of student teachers.

Summary

This chapter described how the main research study was organised and conducted. The ‘test group’ that took part in this work was described, and a description of the discussion forums they used was given. The data was examined to investigate the reflective learning that was in evidence, and focussed on: exploring whether student teachers engaged in reflective learning; understanding the reasons for the student teachers’ reflective learning from their on-line communication; identifying the components of reflective on-line communication.

The data revealed that the student teachers did engage in reflective learning, but that in this research a new categorisation was needed to accurately determine the level of the students’ reflective activities. The new categorisation had the following classifications of reflective learning: reflective inquiry, reflective sharing, reflective reading and analytical reflection. A consequence of this new classification of on-line reflective activity was to identify a new approach for teaching reflective practice in on-line forum discussions.

The second area of investigation for this research project was the extent to which the on-line discussion forums could be used to encourage professional socialisation, and focussed on: understanding the student teachers’ experience of on-line professional socialisation; identification of the causes and motivating factors of on-line professional socialisation amongst the student teachers.

This research revealed that the on-line professional socialisation that the student teachers experienced helped them to develop their thoughts, values, attitudes and beliefs of the teaching profession. Their experience also improved their skills in negotiation, communication and collaboration. The next chapter presents conclusions of this research and attempts to answer the central research questions of this work.

Introduction

This thesis has been organized into six chapters. The first chapter introduced the purpose, aims, significance and context of this project and described the central research questions. Chapter Two reviewed the literature on reflective practices and professional socialisation within the medium and context of computer mediated communication. Chapter Three revisited the research questions and described the research methodology used in this research, and Chapter Four described an Initial Study that explored the use and effect of the various research methods. Chapter Five then presented, described and analysed the gathered data, which resulted in a number of research findings.

This chapter discusses the findings of this research, using the headings ‘reflective learning’ and ‘professional socialisation’, and relates this work to the findings of other researchers mentioned in the literature review chapter. Limitations and recommendations of this research project are then presented, followed by suggestions and directions for future research.

Within the PGDE course there are a number of important elements in the informal social interaction between students that are valued by academic staff. Three key areas are: the opportunities that are afforded to students to discuss, develop and formulate ideas and perceptions on issues arising from the course (Crane, 1972; Hagstrom, 1965; Price and Beaver, 1966; Coser, 1970); the development of their capacity to become reflective practitioners (Schön, 1982); and, the development of their identity and role within the teaching profession, where the students appreciate and engage in the social learning of

values, attitudes, beliefs and language of teaching professionals (Weedman, 1999). Within this context, the criteria that are being used to examine the effectiveness of computer mediated communication in this research project are the extent to which it supports and encourages reflective learning, and the extent to which it encourages and develops the professional socialisation of the student teachers.

Reflective learning

The student teachers' use of the discussion forums in Moodle showed the potential of this medium to encourage a reflective interactivity between students. This research has shown how computer mediated communication can be used by the tutor to develop the students' reflective capabilities and practices, and supports the work of Vygotsky (1978) and Kolb (1984) who described group reflection to be both educationally effective and personally rewarding for the students.

The messages posted by the students in the on-line discussion forums were analysed using Gunawardena *et al.*'s (1997) 'Interaction Analysis' model. This analysis revealed that 82% of the messages sent by the student teachers within the Tutorial forum were in the 'sharing and comparing' category, 9% in the 'discovery and exploration' category, 6% in the 'negotiation and construction', 2% in the testing and modifying' category and less than 1% in the 'application' category. These statistics suggest that the student teachers involved in this research were not engaging in the deeper levels of reflective practice, as categorised by Gunawardena *et al.*'s (1997) 'Interaction Analysis'. Consequently, in an effort to determine more exactly the student teachers' reflective activity and to identify the components of their reflection the student teachers' forum messages were re-examined with a view to producing a more appropriate method of categorising the student teachers' reflection within on-line discussion forums.

Using a grounded theory approach led to the discovery of four separate categories of reflective activity commonly used by the student teachers within Gunawardena *et al.*'s (1997) 'sharing and comparing' group. I labelled these four new categories as 'Reflective Inquiry', 'Reflective Sharing', 'Reflective Reading' and 'Analytical Reflection'.

Reflective Inquiry involved the student teachers in reading the initial posts made by the tutor and then responding with answers that reflected their thoughts.

Reflective Sharing involved the student teachers reading the contributions made by the other student teachers, which presented an opportunity to tap into the experience of the other student teachers, and provided the students with a rich source of information.

Reflective Reading involved the student teachers referencing lectures, educational literature and contextualizing the knowledge gained from the course and their teaching practice school and applying it to the forum discussion.

Analytical Reflection was seen when the student teachers evaluated and included reference to other student teachers' messages to strengthen and reinforce the points and views they were making in the on-line discussions.

The above categorisation, as well as more accurately identifying the reflective activity of the student teachers' messages, also provides the on-line tutor with a more clearly defined description of the different types of reflection that the student teachers were engaged in.

As a result of identifying these different categories the on-line tutor can, in the future, focus their teaching to encourage and develop these different categories of reflective activity, as described in Chapter 5. The link between teaching and measuring reflection

was explored by Galvez-Martin *et al.* (1995) who sought to improve student teachers' level of reflection through specific instruction. Galvez-Martin *et al.* (1995) found that by providing the student teachers with structured guidance it was possible to significantly improve their levels of reflection. The findings from this research study do not support the work of Galvez-Martin *et al.* at this stage. Further work is required to see if the new categorisation suggested by this research provides the tutors with a clearer view of the student teachers' on-line reflection and consequently provides an opportunity for the tutor to focus more sharply their on-line development of the student teachers' reflective activity.

I believe this new categorisation could effectively be used in conjunction with Gunawardena *et al.*'s (1997) "Interaction Analysis". This research found that 82% of messages sent by student teachers, with little experience of on-line reflective practices, were categorized within the 'sharing and comparing' category, but that this category did not accurately measure the range of reflective activities that were actually taking place. Using the new categories within Gunawardena *et al.*'s 'sharing and comparing' category helps the tutors to more accurately categorise the on-line reflection of the student teachers forum discussion messages.

Professional socialisation

This research supports the work of Austin *et al.* (2003), Kearsley (1995), Vrasidas and McIsaac (1999), and Zhu (1998) who all described on-line interaction within discussion forums as a form of social exchange and knowledge construction. The student teachers created a sense of 'social gathering' within the forums as they engaged cooperatively with each other. This on-line engagement was an interactive and interpretive process (Kuzmic and Rust, 1994) where the student teachers were not only influenced by the expressions of their peers, but where they also influenced and had an effect on the on-line community

they joined. The on-line socialisation and community that evolved was based on the direction, personal characteristics and energy of the participants, and which had the property of the sum of the parts being considerably greater than the individual components (Wenger, 1998).

The student teachers commented on a sense of collegiality within the forums, where they were able to exchange experiences both from their school teaching practice and from college. The student teachers described how they felt comfortable communicating on line, particularly with other students they knew. The student teachers also described how the Moodle forums gave each student an equal opportunity to express themselves, which some felt the face-to-face tutorial meetings did not.

The students believed the forums improved their skills in communication and collaboration and provided a supportive structure in which they could interact and communicate on both personal and professional matters with their peers. The student teachers' experience and socialisation from the on-line discussion forums in this research helped them to develop their thoughts, values, attitudes and beliefs about the profession they hoped to join, development that supported the professional socialisation of the student teachers.

Limitations

The paradigm of 'interpretivism' was used in this research to resolve the subjectivity-objectivity debate (Eisner, 1993; Phillips, 1993), refer to Chapter 3 Research Methodology for further details. This approach was found to be appropriate, because by adopting 'interpretivism' this research focused on a subjective understanding of data that was obtained from the student teachers and did not aim to test or prove theoretical concepts, but instead allowed the theory to emerge from and which was 'grounded' on data generated

from the research (Glaser and Straus, 1967). This approach resulted in the findings described in the previous chapter, and using a grounded theory approach led to the insight of a new classification of levels of reflection in on-line forum discussions. However, there were a number of limitations of this research, and these have been listed below:

- Use of a case study methodology;
- The pressurised nature of the PGDE course;
- ‘Insider’ research.

The use of a single case study as a methodology was found to have both strengths and weaknesses. The strength was found to be in the in-depth investigation of the student teachers’ use of the discussion forums and the understandings that were obtained on the students’ experiences, which incorporated a variety of research methods that included both quantitative and qualitative data (Janesick, 1994; Silverman, 1993; Stake, 1994; Yin, 1989). The weakness was that the main research study only involved one cohort of students and so the findings of the research, such as the teaching approaches suggested by the new categorisation of the reflective activities of the student teachers, were not then subsequently tested and trialled. This limitation could have been overcome, if more time had been available, by adopting a longitudinal approach (Yin, 1994) and an action research model (Cohen *et al.*, 2000), which would have facilitated the testing and further subsequent development of this study’s research findings.

The student teachers on the PGDE course spent two days a week in school on teaching practice and three days in college attending lectures, tutorials, workshops etc. The student teachers recognised that they needed to plan their time, both in school and in college, very carefully if they were to complete course. The course demands placed considerable pressure on the students and these demands *significantly reduced the amount of time the*

students had during the week to communicate in on-line discussion forums. The students were not allocated any extra time within their weekly schedules to participate in the on-line forum discussions and the students frequently referred to this lack of time in the focus group discussions. Consequently, less time was spent on the on-line reflective tasks than the activities required, with some of the forum discussions showing very little activity and there were some cases of students choosing not to engage at all. This limitation could have been alleviated if the student teacher had been allocated a certain amount of time each week to use the on-line forum discussions.

Conversely, it is important to recognise that although many of the student teachers mentioned their lack of time and course pressures for not interacting to a greater extent in the on-line forum discussions, many students were able to find time to interact on-line. 97% of students believed it to be a useful addition to the course, and that the opportunities provided by the VLE to engage in computer mediated communication offered an additional opportunity for the students to communicate with their peers. This on-line communication did not detract from the other more traditional channels of communication, but provided an increase in the student teachers' overall amount of discussion.

Whilst I was conducting this research I was employed by the Education Department at NUI Maynooth and worked as a tutor on the PGDE course, being responsible for a tutorial group, and so had a direct involvement with the research setting. This involvement between work and research raised the issue of insider or practitioner research (Robson, 2002). The main problem with insider research is that the concept of validity becomes increasingly problematic because of the researcher's involvement with the subject of study.

The concepts of validity in a research study are complex and are dependent on various ontological and epistemological assumptions about the nature of reality and truth, refer to

Chapter 3 Research Methods. The validity of insider research, particularly in qualitative studies, raises numerous concerns and unanswered questions. For example: what constitutes validity; how can we guarantee that research is valid and trustworthy; did my relationship with the student teachers have a negative/positive impact on their responses?

While these questions are important to consider, Hammersley (1993) argues that they should be considered in all research regardless of the researcher's position, and that research is inevitably coloured (consciously and unconsciously) by social, historical and cultural backgrounds. Whilst working on this project I have come to realise that there are no definitive answers to these questions of validity, but have begun to appreciate how important it is to be aware of them and to be aware of my own limitations as a researcher (Hammersley, 1993). In considering this I have found the work of Deem and Brehony (1994) to be helpful:

Perhaps then, validity is best regarded as something, which is to be worked towards rather than fully achieved.

(Deem and Brehony. 1994: 165).

Recommendations

The findings that have emerged from this project lead to a number of recommendations, which are described below.

1. *Use of computer mediated communication to support the PGDE tutorial group*

This research project has highlighted some of the benefits to the tutor in providing the tutorial groups with access to on-line communication. For example, during this research project the on-line forums provided the tutor with opportunities to extend the tutorial beyond the time allocated by the course to potentially provide 24/7 tutorials. On-line forums provide the student teachers with opportunities to communicate and participate in tutorial discussions both on and off campus, as and when it suits them, and provides the students with additional opportunities to reflect and contribute to tutorial discussions. The availability of on-line tutorial forums offers the tutors opportunities to address a greater range of topics. For example, by carefully planning their tutorials the tutor can introduce issues / discussions and then ask the students to continue the debates outside of the tutorial in the on-line forums.

The literature suggests that the PGDE tutorial group forms an ideal on-line group, particularly from the point of size. The tutorial group size in 2007-2008 ranged from 14 to 17 which made the tutorial group large enough to have a steady flow of messages into the on-line forums, but also small enough to encourage the individual contributions of each member of the group (Isroff and Eisenstadt, 1997; Light *et al.*, 1997; McAteer *et al.*, 1997; Tucker *et al.*, 1997; Wilson and Whitelock, 1998). Another key factor described in the literature, is the importance for the group in meeting both face-to-face and on-line, as it has

been found that the students invariably communicate better on-line with people that they have met (Lewis, 1997; Levinson, 1989; McAteer *et al.*, 1997).

An important function of the PGDE tutorial system is to provide support for the student as they progress through the course. Including an on-line element to the tutorials enhances the opportunities of the student teachers to communicate and exchange experiences both from their school teaching practice and from the PGDE course. The student teachers noticed how the on-line forums not only increased the opportunities to communicate, but also helped to encourage a greater sense of collegiality.

2. *Integrate on-line communication into the PGDE course*

Providing the student teachers with access to on-line communication is not enough on its own, the literature shows that students will not use this form of communication unless they have a compelling reason to do so (Austin *et al.*, 2003; Canning and Swift, 1992; Levinson, 1989; Mason and Bacsich, 1998; McAteer *et al.*, 1997; Riel and Levin, 1990). Integrating on-line communication into the PGDE course by using it in tutorial work, for example as described above, is one approach that could be used within the course. Other examples might include involving the student teachers in on-line activities that engage them in collaborative student-centred learning, which are linked to the students' progress and development on the course.

A compelling reason for the student teachers to use on-line communication would be if it was linked to their assessment on the PGDE course. During this research the students frequently asked whether their interaction in the on-line forums would be assessed, and some students would clearly have been much more diligent and forthcoming in posting messages if their communication in the forums had in some way formed part of their

coursework assessment. One example of a particular assessment that would appropriately follow on from this research would be to include an on-line reflective task/activity as part of an 'assessment for learning' approach (Black *et al.*, 2003) that assesses the students' on-line reflective capability using the criteria of the new and existing categories of reflection described above.

To successfully integrate on-line communication into the PGDE course consideration should be given to a number of factors, including the students' access and availability to technology and the time allocated each week for the students to interact on-line. In addition, the tutors should carefully plan and structure the on-line activities and the social exchanges to maximise the social interaction and the 'situated learning' that takes place (Lave and Wenger, 1990).

3. Use of the new categorisation to measure on-line reflective practice

This research recommends that the student teachers' on-line reflective capabilities are measured by categorising their forum messages using Gunawardena *et al.*'s (1997) 'Interaction Analysis' in conjunction with the new categories resulting from this research, described in Chapter 5. The students' messages should be first classified using Gunawardena *et al.*'s categorisation, with the messages in the 'sharing and comparing' category, then secondly re-classified using the new categories.

Categorising the student teachers' messages in this way helps the tutor to identify the different reflective activities that the students are using. Referring to the two sets of categories can enable the tutor to identify more accurately the type of reflection used by the student. Recognising the precise category of reflection in the student teachers'

message helps the tutor to focus their teaching on developing particular reflective capabilities that are appropriate to the needs of the student.

4. *The development of the role of the tutor in the encouragement and development of the student teachers' on-line reflective activities*

The literature describes the significance of the tutors' skills in moderating and contributing within discussion forums (Salmon 2002), and this is supported by the findings from this research, which shows how influential the role of the tutor is in encouraging on-line interaction amongst their students. The findings also show that the student teachers did not find the on-line forum discussions intuitive to use. This was supported by various studies in the literature, for example, Light *et al.*, (1997) and Trentin (1997) found that it was significant if students had experienced on-line communication before, and other researchers described the importance of the initial technical preparation and practice of the students (Canning and Swift, 1992; Steeples *et al.*, 1994; Bates, 1995). Consequently, the tutor needs to guide the students carefully through the early stages of their use of on line communication, providing both technical help and support in developing their communicative skills.

Another aspect of the tutors' role is to encourage the reflective activities of the students. This research is recommending that the tutor uses the categories described above to accurately identify the reflective activity of the student teachers' messages. As a result of identifying the reflective component in the students' messages the on-line tutor can then focus their teaching more specifically to encourage and develop the student teachers' reflective capabilities.

5. *Encourage on-line professional socialisation activities*

This recommendation involves encouraging activities for the student teachers that develop their practice of professional socialisation. It was evident from this research that student teachers often experienced professional socialisation indirectly through their communication of experiences involving the teaching practice school, university and the other student teachers. It was also noted by the tutors that the student teachers used problem-solving techniques through their collaborative discussions of problems that they experienced in school and in college. The tutors mentioned that they thought the consequence of this was that the students would be better able to cope with the adjustments necessary to work within new and potentially different school cultures in their early teaching years. The suggestion from this is that professional socialisation activities have the potential to provide a rich source of practical knowledge and learning that is very relevant for the student teacher, and which should be encouraged and integrated into the PGDE course programme.

6. *Engage student teachers in communities of practice within the PGDE course*

The student teachers on PGDE courses are encouraged to adopt social-constructivist teaching and learning skills in their classrooms, but traditionally are taught in a behaviourist learning environment in college (Rickard *et al.*, 2009). This anomaly sends a mixed message to the student teachers. However, as has been mentioned earlier in Chapters 1 and 2, there has been a significant growth in the availability of technology in schools and colleges, which provides a number of opportunities for the student teachers to engage in social constructivist activities with other students and teachers and to use technology for reflective and professional socialisation purposes. For example, the student

teachers have an opportunity to engage within various professional, subject-based, on-line communities of practice.

Wenger (1998) describes a community of practice as a social process for learning in groups, where participants bring their own individual knowledge which when shared becomes part of the community's knowledge. If the student teachers are to actively engage in on-line professional socialisation through the use of communities of practice, as suggested by this research, then it is recommended that they interact within and develop communities of practice as part of their PGDE course activities.

Future Work

This research study has shown how important the interaction within on-line forum discussions can be for student teachers, both from a reflective learning and a professional socialisation viewpoint. This research recommends that tutors should develop the student teachers' on-line reflective practice to a greater extent and that greater consideration should be given to the teaching and learning opportunities that on-line discussion forums present. However, aspects of this need to be investigated further and a number of questions for further study have emerged, which are listed below:

1. Does on-line communication change or modify the process of learning that the student teachers engage in?

This question arises from an original concern expressed at the start of this project; namely, how far should third level colleges go in embracing new technology, to what degree should they adopt these methods and what are the effects of altering existing teaching and learning contexts? This research focussed on two aspects of student learning, reflection and

professional socialisation, but further investigation is required to understand whether on-line communication changes or modifies other aspects of the student teachers' development.

2. To what extent should on-line forums be integrated into the structure of teacher education programmes?

A recommendation of this project is to integrate the on-line forum discussion activities into the PGDE course. However, the extent of this integration, with regard to the amount and which parts of the course should be supported with on-line activities, needs to be addressed carefully.

3. To what extent should teaching staff moderate the student teachers' communication?

The findings from this research suggest that the tutor's role in encouraging and developing the student teachers on-line interaction is highly significant. A key aspect of the on-line tutor's role is in their moderation of the on-line forum discussions (Salmon, 2003). The tutor has difficult skills to develop that involves their on-line teaching through their moderating of the students' messages, but to what extent should this be carried out through on-line moderating and how should the tutor most effectively manage the students' on-line learning?

4. Does the new categorisation of reflection suggested by this research provide the tutor with a clearer view of the student teachers' on-line reflection, and provide an opportunity for the tutor to focus more sharply their on-line development of the student teachers' reflective activity?

Galvez-Martin *et al.* (1995) found that tutors could improve the student teachers' levels of reflection if they provided the students with structured guidance. The findings from this research study suggest that the new categorisation would provide the tutors with a clearer view of the student teachers' on-line reflection, but little evidence has been collected on the tutors' on-line development of the student teachers' reflective activities in light of this 'clearer view'.

5. What is the role of the student teacher in developing on-line professional socialisation in schools?

The findings from this research reveal how the student teachers thought many teachers working in schools were unaware of the potential on-line communication offered. Consequently, the student teachers could have an important role to play in informing and developing new practices, such as on-line professional socialisation, in their teaching practice school.

6. How can the professional socialisation of student teachers be utilised as a pedagogic approach on the PGDE course?

This research has shown that the student teachers' experience and socialisation within the on-line forums helped to develop their thoughts, values, attitudes and beliefs of the teaching profession. Consequently, on-line socialisation would appear to offer a rich source learning for the student teacher, but how should the PGDE course harness this potential?

7. Can on-line professional socialisation encourage and support the professional development of teachers?

A recent development in Ireland has been the growth in a number of post-primary subject associations creating on-line areas for their members to communicate and share resources and ideas with each other. These on-line areas provide a form of professional socialisation and provide their members with opportunities to acquire professional and subject-based information. The findings from this research suggest that the professional socialisation activities the student teachers engaged in has the potential to provide a rich source of practical knowledge and learning. This suggests that a potential exists to use these on-line subject association areas as a source of teacher professional development.

8. How can an on-line community of practice be used as a pedagogic technique within a teacher education programme, and what are the resulting effects on the student teachers?

This research is suggesting that student teachers should actively engage in on-line professional socialisation using communities of practice, and that professional socialisation activities can offer the students valuable learning opportunities. This raises the question, should the student teachers be taught to interact within communities of practice on the PGDE course, and if so, can an on-line community of practice be used as a pedagogic technique and to what effect?

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Appendix A

Results from the on-line initial questionnaire 2008

Computer Mediated Communication

1. Have you used computers before?

| | Response Percent | Response Total |
|-----------------------|------------------|----------------|
| Yes | 100% | 13 |
| No | 0% | 0 |
| Total Respondents | | 13 |
| Skipped this question | | 0 |

2. Do you have any experience of using a computer for learning? Please tick any of the boxes that apply to you.

| | Response Percent | Response Total |
|--|------------------|----------------|
| I have used a computer to produce submitted / assessed work (e.g. with Word). | 100% | 13 |
| I have used educational software on a CDROM. | 46% | 6 |
| I have used relevant websites as part of my learning. | 62% | 8 |
| I have used email or discussion boards as part of my learning. | 31% | 4 |
| I have used a virtual learning environment e.g. WebCT, Blackboard, Moodle, FirstClass. | 23% | 3 |
| Other (please specify). | 0% | 0 |
| Total Respondents | | 13 |
| Skipped this question | | 0 |

3. Your use of technology, please tick if the statement is true or false.

| | Response Percent | Response Total |
|---|------------------|----------------|
| I have a digital camera. | 54% | 7 |
| My mobile phone can be used to take pictures. | 77% | 10 |
| I have sent pictures to other people using my mobile phone. | 62% | 8 |
| I own a computer. | 38% | 5 |
| My computer has a broadband Internet connection | 31% | 4 |
| I have transferred files to an MP3 player. | 38% | 5 |
| I own a memory stick. | 46% | 6 |
| I have watched DVDs on a computer. | 85% | 11 |
| I have accessed electronic journals. | 77% | 10 |
| Total Respondents | | 13 |
| No options selected | | 0 |

4. Computer forums, please pick one response to each statement.

| | Disagree strongly | Disagree | Agree | Agree Strongly | Don't Know | Response Total |
|--|----------------------|----------|--------|-------------------|---------------|-------------------|
| I think it will be useful addition to tutorial work. | 8%(1) | 0 | 54%(7) | 31%(4) | 8%(1) | 13 |
| I would not like people outside the tutorial group to read it. | 0 | 31%(4) | 38%(5) | 23%(3) | 8%(1) | 13 |
| I am concerned about the technical aspects of using forums. | 0 | 31%(4) | 46%(6) | 23%(3) | 0 | 13 |
| Working in groups like this could help to develop my thinking on various topics. | 0 | 31%(4) | 46%(6) | 15%(2) | 8%(1) | 13 |
| I will feel comfortable in making written comments. | 0 | 15%(2) | 46%(6) | 31%(4) | 8%(1) | 13 |
| I am interested in the potential of new technology. | 0 | 15%(2) | 62%(8) | 15%(2) | 8%(1) | 13 |
| I would prefer to use face-to-face meetings for this work. | 0 | 31%(4) | 38%(5) | 23%(3) | 8%(1) | 13 |
| I feel comfortable with discussing topics on-line. | 0 | 38%(5) | 23%(3) | 15%(2) | 23%(3) | 13 |
| Total Respondents | | | | | | 13 |
| Skipped this question | | | | | | 0 |

5. Answer yes or no to the following.

| | Yes | No | Response Total |
|--|--------|--------|-------------------|
| I have experience of working collaboratively with my peers for college assignments | 62%(8) | 38%(5) | 13 |
| I have experience of writing in public forums. | 38%(5) | 62%(8) | 13 |
| I am concerned about the technical aspects of using computer forums. | 54%(7) | 46%(6) | 13 |
| Total Respondents | | | 13 |
| Skipped this question | | | 0 |

6. Please give a short summary of your feelings about using computer forums as part of your tutorial work.

| | |
|---|--|
| 1 | For me it is a unique way working. I like group work and this will hopefully create an enjoyable working/learning experience. |
| 2 | I haven't much technological experience and feel that this would be a good opportunity to broaden my technological skills. It would make me more confident with the vle and computers - not just for educational reasons, but I could use these technologies in my everyday life also. |
| 3 | I am curious about technology but very wary of it at the same time. Some of what we are going to learn would be of interest to me and might be useful later on a cv. |
| 4 | I think I could learn a lot from it. I like working with others. |

| | |
|----|---|
| 5 | I am interested to see how this work will hopefully help develop me into a better teacher. |
| 6 | I want to learn something new. I feel technology will be an important factor in teaching in the future so I want to improve my skills in this area. |
| 7 | Something different. Learn new skills. |
| 8 | I think it will be a challenge and I will learn new skills. |
| 9 | I would like to learn how to use this sort of technology. |
| 10 | I feel it will be interesting and different. |
| 11 | It seems an interesting alternative, and a good chance to become more familiar with technology. |
| 12 | I am naturally a bit apprehensive in working in this way, but I think it will be a lot of fun. |
| 13 | Something different! |

Appendix B

Results from the on-line end of course questionnaire 2009

Section 1: Moodle

- a. Was it a new experience for you to use computer forums?

Yes 5
No 8

- b. Did you find it easy to post messages into the Moodle forums?

Yes 12
No 1

- c. Did you find the instructions that accompanied each topic adequate?

Yes 11
No 2

- d. Did you find the forum discussions helped you to understand the various topics better?

Yes 4
Sometimes 5
No 4

If **not**, please indicate the nature of the difficulties you experienced: Please specify:

| | |
|----|---|
| 1 | <i>Sometimes found that no one else seemed to be thinking the same as myself, forums make it difficult to agree on ideas.</i> |
| 6 | <i>Differences of opinion, are better handled in person.</i> |
| 8 | <i>I thought everyone was playing it safe and no one was putting what they really felt.</i> |
| 11 | <i>It took me ages to put into words what I wanted to say</i> |
| 12 | <i>The discussions only scratched the surface.</i> |

- e. How often on average did you visit the Moodle discussion forum during a typical week?

i. More than once a week 12
ii. About once a week 1
iii. Less than once a week 0

f. How often on average did you post a message to the Moodle discussion forum during a typical week?

- iv. More than once a week 5
- v. About once a week 8
- vi. Less than once a week 0

g. How comfortable did you feel posting messages to the forum?

| | |
|----|---|
| 1 | <i>No problem with posting messages.</i> |
| 2 | <i>I thought the group was supportive and felt very comfortable.</i> |
| 3 | <i>I felt more relaxed talking about the issues.</i> |
| 4 | <i>Was comfortable with fellow students in the forum.</i> |
| 5 | <i>Was unaware that I might be feeling uncomfortable.</i> |
| 6 | <i>OK</i> |
| 7 | <i>Everyone was very accommodating and this made it easy to contribute.</i> |
| 8 | <i>Was sometimes unsure in what people were actually thinking.</i> |
| 9 | <i>Pressure taken off class recording so could concentrate on class.</i> |
| 10 | <i>Very comfortable.</i> |
| 11 | <i>Worried about it, I spent ages working out what I was going to say</i> |
| 12 | <i>Quite comfortable.</i> |
| 13 | <i>I was OK about it.</i> |

h. Did you carry out any research before posting a message into the forum?

- Yes 2
- No 11

If yes, please indicate the type of research you carried out:

| | |
|---|---|
| 1 | <i>Course notes and books.</i> |
| 5 | <i>Used Google Scholar to get ideas and check things out.</i> |

Section 2: Evaluation

1. Write three things you liked most about the project

| | |
|---|--|
| 1 | <ul style="list-style-type: none"> • <i>Checking to see if anyone had commented on your messages.</i> • <i>Sending in postings and making comments</i> |
| 2 | <ul style="list-style-type: none"> • <i>Different way of working</i> • <i>Learning more about technology</i> • <i>Chance to learn more about my colleagues on the course.</i> |
| 3 | <ul style="list-style-type: none"> • <i>Technology learning, even if still not great</i> |
| 4 | <ul style="list-style-type: none"> • <i>Encouraged you to say whatever you liked</i> • <i>Was different.</i> • <i>Was interesting informative and even exciting</i> |
| 5 | <ul style="list-style-type: none"> • <i>Seeing other students messages.</i> • <i>Comparing and contrasting.</i> • <i>Learning new ideas</i> |

| | |
|----|---|
| 6 | <ul style="list-style-type: none"> • <i>Got to know people really well.</i> • <i>Learned new technology.</i> • <i>Learned new things.</i> |
| 7 | <ul style="list-style-type: none"> • <i>Technology</i> • <i>Computer work</i> • <i>Getting ideas from other the other students</i> |
| 8 | <ul style="list-style-type: none"> • <i>Teamwork</i> • <i>It was a huge learning curve</i> • <i>It was excellent practice in using technology</i> |
| 9 | <ul style="list-style-type: none"> • <i>Group work</i> • <i>Something different</i> • <i>Not afraid of the technology</i> |
| 10 | <ul style="list-style-type: none"> • <i>Encouraged a different type of teamwork</i> • <i>Learning new technology</i> • <i>The level of communication required</i> |
| 11 | <ul style="list-style-type: none"> • <i>Getting to know people in a different way</i> • <i>Becoming familiar with technology</i> • <i>Learning how to express myself on-line</i> |
| 12 | <ul style="list-style-type: none"> • <i>Interesting idea.</i> • <i>Great scope for topics.</i> • <i>Allowed for creativity.</i> |

2. Write three things you did not like about the project

| | |
|---|--|
| 1 | <ul style="list-style-type: none"> • <i>Was not enough time with everything else on the course</i> • <i>I would have preferred to have discussed these topics during the tutorials</i> • <i>Discussions take too long, face-to-face is much quicker</i> |
| 2 | <ul style="list-style-type: none"> • <i>Not enough time</i> • <i>Very much on your own</i> • <i>Not enough free computers</i> |
| 3 | <ul style="list-style-type: none"> • <i>Finding the time</i> • <i>So many of us trying to access computers at one time</i> • <i>Would have liked to talk to other groups</i> |
| 4 | <ul style="list-style-type: none"> • <i>Time consuming</i> • <i>The topics we were given for discussion</i> • <i>Could have benefited from a supply of resources</i> |
| 5 | <ul style="list-style-type: none"> • <i>Pressure – to make a comment</i> • <i>Group work – although it turned out alright</i> • <i>Technological aspect</i> |
| 6 | <ul style="list-style-type: none"> • <i>Lack of training</i> • <i>Time constraint</i> • <i>Ambiguity of the topics we were asked to discuss</i> |
| 7 | <ul style="list-style-type: none"> • <i>Having to keep checking the forums</i> • <i>Would have liked to get a text alert when a new message goes in</i> • <i>Writing takes too long</i> |
| 8 | <ul style="list-style-type: none"> • <i>Technology</i> • <i>Hard to know what people are really thinking</i> • <i>Time was short</i> |
| 9 | <ul style="list-style-type: none"> • <i>Better guidelines with the topics</i> • <i>A lot of time wasted writing things I didn't post</i> • <i>Not enough resources</i> |

| | |
|----|---|
| 10 | <ul style="list-style-type: none"> • <i>Too much time spent writing comments</i> • <i>Restricted access to computers</i> |
| 11 | <ul style="list-style-type: none"> • <i>Timing issues</i> • <i>Use of technology</i> • <i>Forming very carefully worded sentences</i> |
| 12 | <ul style="list-style-type: none"> • <i>Technical problems</i> • <i>My lack of expertise in this kind of thing</i> |
| 13 | <ul style="list-style-type: none"> • <i>Greater connection between various topics.</i> • <i>Vague topics for discussion.</i> • <i>Technology was new</i> |

Section 3: Future directions

1. For computer mediated communication

- a. If you were offered the facility of computer mediated communication on another course would you feel happy to use it?

Yes 12
No 1

- b. What aspects, if any, of the work you carried out in the forums would you change?

| | |
|----|---|
| 1 | <i>Get topics that are easier to comment on.</i> |
| 2 | <i>Make the forums anonymous.</i> |
| 4 | <i>Would revise the required time commitment.</i> |
| 5 | <i>Perhaps use our comments to help those doing this next year, as a reference.</i> |
| 6 | <i>Link it with other parts of the course better.</i> |
| 8 | <i>It just needs a bit more structure.</i> |
| 9 | <i>Provide access to resource materials that we could refer to.</i> |
| 10 | <i>Use this as a way of passing comments and thought about the lectures.</i> |
| 11 | <i>Make it less time consuming.</i> |
| 12 | <i>More resources.</i> |
| 13 | <i>Timetable time for us to do this as part of the working week.</i> |

Appendix C

Focus group questions

Question 1: Thinking back to the very beginning of the year when you were first introduced to the computer mediated communication project: what were your feelings about it?

Question 2: How worthwhile was the project in helping you to think about the topics and issues that were raised?

(Probe into the ease of communication and whether they encouraged reflection and the influence the project might have had on the students' developing thoughts.)

Question 3: What were the problems you experienced whilst working on this project?

(Probe how the students overcome difficulties inherent in communicating in this way.)

Question 4: Did the project help you think about ethical issues in working in teaching that you might not otherwise have thought of?

(Probe into whether the students thought more deeply about the issues and whether they engaged in critical thinking.)

Question 5: Has the project changed your view of learning with technology? Would you feel comfortable learning in this way, perhaps on a distance-learning course?

(Probe into whether the students would be happy to use computer mediated communication to communicate with other teachers.)

Question 6: How do you think the project could be improved?

(Probe into the difficulties as well as the advantages of using this approach: was it easy or difficult to achieve the goals set out in the discussions.)

Appendix D

Semi-formal interview

Prompts for semi-formal interview questions with tutors.

| Stage | Activity |
|------------------|---|
| Introduction | Welcome describe the purpose of the interview confidentiality setup recording |
| Question prompts | 1. What are some of the main activities that you utilised in Moodle to support your tutorials? 2. How did you encourage students to interact or participate in the forum discussions? 3. How did you encourage the students to engage in reflection in Moodle? 4. What approach did you take in moderating forum discussions? 5. What are your initial perceptions of using Moodle as a pedagogic tool? 6. What were some of the advantages in using Moodle to support your tutorial work? 7. What were some of the disadvantages in using Moodle to support your tutorial work? 8. How would you use Moodle differently next time in supporting your tutorials? 9. How did your students react to activities you introduced in Moodle? |
| Conclusion | Are there any issues or points that you would like to mention? Do you have any questions? Follow up – thank you for your co-operation |

Appendix E

Interpretative phenomenology

Overview of the interpretative phenomenology approach used in this research study.

| Stage | Activity |
|--------------------------|--|
| Focus group discussions | Focus group discussions Using questions and question prompts (Appendix C) |
| Transcription | Voice transcripts converted into written text Text arranged chronologically into a database |
| Identification of themes | Identify themes that emerge from the transcripts Group related themes together Identify over arching themes |
| Connections | Identify connections between themes in an attempt to generate explanations Identify relationships, underlying conditions, key phenomena, key actions and interactions |
| Reflection | Develop explanatory model and narrative explanation of the findings Compare with similar projects from the literature |

Appendix F

Discourse analysis

Overview of the discourse analysis approach used in this research study.

| Stage | Activity |
|-----------------|--|
| Sample | With reference to the research question select the sample from which the data is to be collected |
| Data collection | Collect the data from focus group discussions, forums and interviews |
| Transcription | Transcribe and organise data into database |
| Coding | First pass through data, provisionally and qualitatively Initial observations recorded |
| Analyse | Checking variability and consistency Re-check for repertoires or discourses that are emerging |
| Validate | Check the repertoires and discourses Identify inconsistencies and problems |
| Report | Feed the findings and interpretations into the research study |

Appendix G

Grounded theory

Overview of grounded theory process used in this project.

| Stage | Activity |
|-------|--|
| 1 | Data collection, transferring forum messages into a database Facilitating easier access and viewing of messages |
| 2 | Arranging data chronologically Facilitating easier data analysis |
| 3 | Read through forum messages and identify concepts Label and group emerging concepts |
| 4 | Identify categories from the emerging concepts Develop connections between categories |
| 5 | Identify propositions of emerging categories Integrate categories to build theoretical framework |
| 6 | Compare emerging theory with literature Compare with similar researched theories |